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Results of the Separations Area Ground-Water Monitoring Network for 1985

Albert G. Law
Aaron L. Schatz

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Prepared for the U.S. Department of Energy
under Contract DE-AC06-77RL01030

Rockwell International
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EXECUTIVE SUMMARY

The purpose of this report is to present a summary of the results for calendar year 1985 of the Rockwell Hanford Operations (Rockwell) ground-water monitoring program for the Separations Area of the Hanford Site. This monitoring program is in partial fulfillment of the U.S. Department of Energy (DOE) requirement that all radioactivity in the environment be monitored.

The objectives of the monitoring program are to (1) evaluate the quality of ground water for compliance with Rockwell and DOE guidelines, (2) assess the performance of waste disposal and storage sites in the Separations Area, (3) determine the impact of waste disposal operations on the ground water, and (4) provide data for hydrologic analyses and model application.

The 1985 Separations Area unconfined aquifer monitoring network included 127 wells. Water samples were collected monthly, quarterly, or semiannually from the wells in the network. These samples were selectively analyzed for total alpha, total beta, tritium, ^{90}Sr, ^{137}Cs, ^{60}Co, ^{106}Ru, uranium, and nitrate. Average radionuclide concentrations in monitoring wells for 1985 were similar to 1984, with the exception of wells at the 216-U-1/2 cribs.

Water levels were measured in 224 wells to produce water table maps of the Separations Area (annually) and of the Hanford Site (semiannually).

Radionuclide concentrations in the ground water within the Separations Area are compared with the Rockwell internal guidelines of RHO-MA-139, Environmental Protection Manual, Part L, which are applicable at the waste sites. These guidelines have their basis in DOE orders. The comparisons are conservative for the Separations Area since concentrations would be reduced by sorption, dispersion, dilution, and decay by the time flow reached the site boundary. Tritium, which is controlled on the basis of discharge concentrations, did not exceed the radioactivity levels specified in RHO-MA-139.

Guidelines were exceeded at active liquid waste disposal facilities in the following cases.

- The average ^{90}Sr concentration in three wells at the 216-A-25 pond exceeded RHO-MA-139 guidelines in 1985. This contamination was localized and below levels reported in 1984. The second stage of pond deactivation was completed during 1985.

- Concentrations of ^{234}U and ^{238}U exceeded RHO-MA-139 guidelines in two wells at the 216-B-62 crib. Concentrations were similar to those in 1984.

- Concentrations of ^{238}U exceeded Rockwell guidelines at the 216-U-16 crib as a result of previous contamination at the inactive 216-U-1/2 cribs. Since waste disposal to the 216-U-16 crib supplied the driving force, it was removed from service.

For inactive disposal facilities, guidelines were exceeded in the following cases.

- At the 216-B-5 reverse well, ^{90}Sr, and ^{137}Cs concentrations exceeded RHO-MA-139 guidelines. The average ^{90}Sr concentration in this well for 1985 was similar to the concentration reported for 1984.

- The ^{90}Sr concentration exceeded RHO-MA-139 guidelines in one well at the inactive 216-S-1/2 crib, although concentrations were similar to 1984.

- An investigation of elevated uranium levels at the 216-U-1/2 cribs indicated the contamination results from past operations at the crib in combination with the startup of the 216-U-16 crib. Four new monitoring wells were constructed. Remedial action was conducted, and consisted of grout sealing three existing wells and pumping ground water to remove uranium via an ion exchange process, which operated at 94% efficiency. Effluent from the ion exchange column was disposed to the 216-S-25 crib. Uranium concentrations in the ground water exceeded Rockwell guidelines, but probably represent background levels resulting from the operation of U Pond.

- The concentration of ^{238}U exceeded RHO-MA-139 guidelines in three wells at the 216-U-10 pond. The concentrations were similar to those for 1984. The 216-U-10 pond was deactivated in 1984.

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1.0 INTRODUCTION

1.1 BACKGROUND

The U.S. Department of Energy (DOE) Hanford Site is located in southeastern Washington State, approximately 170 mi (270 km) southeast of Seattle and 125 mi (200 km) southwest of Spokane (fig. 1). The Hanford Site is used for nuclear reactor operation, reprocessing of spent fuel, and management of radioactive waste. The fuel reprocessing and radioactive waste management facilities in the 200 East and 200 West Areas are operated by Rockwell Hanford Operations (Rockwell).

Because the influence of liquid waste disposal activities extends beyond the 200 Areas, the Separations Area (see fig. 1 and appendix A.3) has been designated as the area of interest for ground-water monitoring purposes. Rockwell maintains a ground-water monitoring program for the Separations Area as part of its waste management responsibility. This monitoring program, based on the requirements of DOE Order 5484.1, Environmental Protection, Safety, and Health Protection Information Reporting Requirements, focuses on evaluating the impact on the aquifer of liquid waste discharged to ground, as specified in DOE Order 5480.1, Environmental Protection, Safety, and Health Protection Program for DOE Operations, chapter XII, "Prevention, Control and Abatement of Environmental Pollution."

Radionuclide concentrations in the ground water are compared with Rockwell internal guidelines, as defined in RHO-MA-139, Environmental Protection Manual, Part L. The Rockwell RHO-MA-139 guidelines have been established with the goals of minimizing contaminants in the ground water in order to attain as-low-as-reasonably-achievable (ALARA) dose rates and meeting drinking water standards at the end of institutional control (assumed to be in 300 years).

The Rockwell ground-water monitoring program for the Separations Area is coordinated with the Hanford Site ground-water monitoring program conducted by Pacific Northwest Laboratory (PNL). The PNL program is responsible for estimating and evaluating the impact of ground water on the general public from operations at the Hanford Site.

1.2 PURPOSE AND OBJECTIVES

The purpose of this report is to present ground-water data collected during calendar year (CY) 1985 and to interpret the impacts of Rockwell processing operations on the unconfined aquifer.

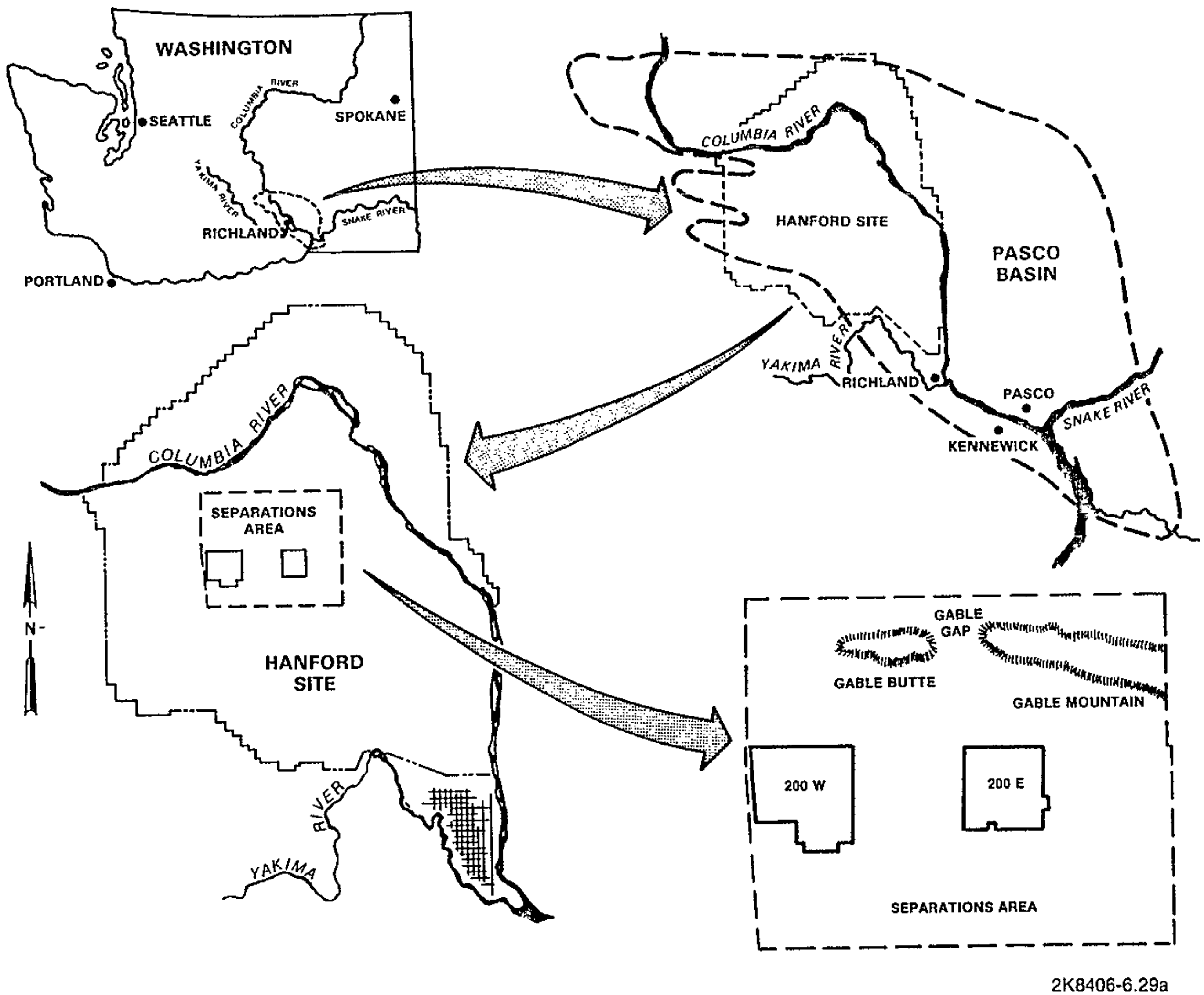

Figure 1. Separations Area Location Map.

The objectives of the Rockwell ground-water monitoring program are as follows:

- Evaluate the quality of ground water for compliance with guidelines
- Assess the performance of Rockwell's disposal and storage sites in the Separations Area
- Determine the impact of waste disposal operations on the ground water
- Provide data for hydrologic analysis and model application. To complement the water quality data obtained by sampling and analyses, water table contour maps are developed to provide basic information on the directions and rates of ground-water flow.

The Plutonium and Uranium Extraction (PUREX) Plant and associated facilities continued operation in 1985. Operation of these process plants and support facilities did not have a significant impact on the quality of the ground water during CY 1985 with the exception of tritium. However, the increase in tritium is expected (DOE 1983). This annual report will discuss each of the active cribs and provide average contaminant concentrations in the ground water for CY 1985.

1.3 HYDROGEOLOGY

Detailed documentation of the geology and hydrology of the Separations Area is reported in Geology of the Separation Areas (Tallman et al. 1979), Hydrology of the Separations Area (Graham et al. 1981), and in Hydrologic Studies within the Columbia Plateau, Washington: An Integration of Current Knowledge (Gephart et al. 1979). These reports are summarized in the following paragraph.

The Hanford Site is located within the Pasco Basin, a structural and topographic basin (see fig. 1) with boundaries defined by anticlinal structures of the basalt. There are three main geologic units beneath the Hanford Site which are, in ascending order, the Columbia River Basalt Group, the Ringold Formation, and the glaciofluvial sediments. The Columbia River Basalt Group, composed of the Grande Ronde Formation, the Wanapum Formation, and the Saddle Mountains Formation, is a thick sequence of basalt flows extruded from fissures during the Miocene epoch. The Ringold Formation, a Pliocene fluvial sedimentary unit, overlies the Columbia River Basalt group except in areas where erosion has removed these sediments. The Ringold Formation is subdivided into four units (on the basis of texture), which are, in ascending order, the basal Ringold unit (sand and gravel), the lower Ringold unit (clay, silt, and fine sand with lenses of gravel), the middle Ringold unit (occasionally cemented sand and gravel), and the upper Ringold unit (silt and fine sand). The glaciofluvial sediments, informally named the Hanford formation, were deposited on top of the Columbia River Basalt Group and the Ringold Formation during the Pleistocene epoch.

1.3.1 Occurrence of Ground Water

The unconfined aquifer is affected by disposal of waste from surface and subsurface disposal sites. The depth to ground water varies from 180 to 310 ft (55 to 95 m) on the 200 Area plateau. The unconfined aquifer is contained within the Ringold Formation and the overlying Hanford formation. Beneath the unconfined aquifer is a confined aquifer system consisting of sedimentary interbeds or interflow zones that occur between dense basalt flows or flow units. The bottom of the unconfined aquifer is the uppermost basalt surface or, in some areas, a clay zone of the Ringold Formation. The thickness of the unconfined aquifer in the Separations Area varies from less than 50 to 200 ft (15 to 61 m).

The sources of natural recharge to the unconfined aquifer are rainfall from areas of high relief to the west of the Hanford Site and the ephemeral streams, Cold Creek and Dry Creek. From the recharge areas, the ground water flows downgradient and discharges into the Columbia River (see Plate 1). This general flow pattern is modified by basalt outcrops and subcrops in the Separations Area and by artificial recharge in the Separations Area.

The unconfined aquifer beneath the Separations Area receives artificial recharge from liquid disposal areas. Cooling water disposed to ponds forms ground-water mounds beneath three high-volume disposal sites: U Pond in 200 West Area, B Pond east of 200 East Area, and Gable Mountain Pond north of 200 East Area (fig. 2). The water table under B Pond has risen approximately 30 ft (9 m) compared with pre-Hanford conditions (Newcomb et al. 1972). The water table under U Pond rose approximately 65 ft (20 m) while it was in operation, although it has declined about 8 ft (2.4 m) from that level since the pond was deactivated in 1984. Part of Gable Mountain Pond has been backfilled in preparation for deactivation.

1.3.2 Aquifer Properties

Large differences in aquifer properties are evident between the Hanford formation and the middle member of the Ringold Formation, the major units of the unconfined aquifer. Hydraulic conductivities range from 10 to 230 ft/day (3 to 70 m/day) for the middle Ringold unit and from 2,000 to 10,000 ft/day (610 to 3050 m/day) for the Hanford formation. Transmissivity increases from the 200 West Area to the 200 East Area. This transmissivity increase is a result of two factors: an increase in saturated thickness of the aquifer (the result of a drop in the basalt surface), and more of the unconfined aquifer is contained within the more permeable Hanford formation.

1.3.3 Flow Dynamics

Ground-water flow is perpendicular to the water table contours delineated in figure 2. Flow patterns are dominated by ground-water mounds under U Pond and B Pond. Flow from 200 West Area is primarily toward the east. The flow system in 200 East Area is complex due to changes in aquifer thickness and hydraulic properties, the influence of B Pond, and the basalt subcrops and structures of Gable Mountain and Gable Butte. The flow from

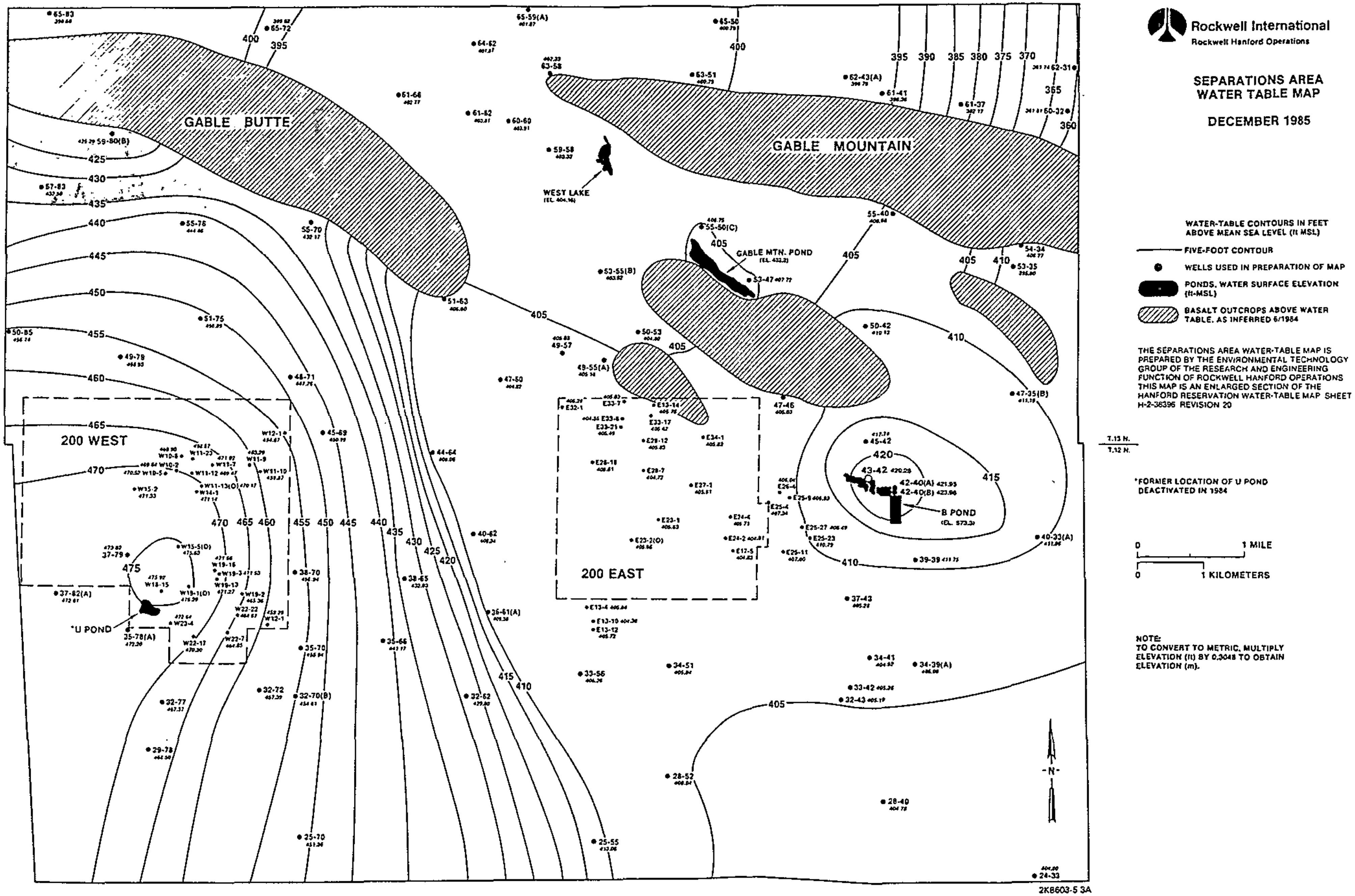

Figure 2. Water Table Map for the Separations Area, December 1985.

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200 East Area and environs is northward through Gable Gap (between Gable Butte and Gable Mountain) and southeasterly toward the Columbia River. Radial flow from the mound under B Pond is eastward toward the Columbia River, in addition to its combining with the northern and southeastern flow from 200 East Area.

1.3.4 Contaminant Transport

Contaminants in ground water move along flow paths that are perpendicular to water table contours. Migration of contaminants may be attenuated by factors within the geohydrologic system: sorption, dispersion, dilution, and radioactive decay.

Sorption is the process by which contaminants are chemically bound to the surface of sediment particles in the subsurface environment. A measure of sorption is the distribution coefficient, K_d, which describes the partitioning of a solute between liquid and solid phases in the subsurface environment. The K_d may be defined as the mass of solute on the solid phase per unit mass of solid phase divided by the concentration of solute in solution expressed in mL/g (Freeze and Cherry 1979). Thus, if K_d = 0 mL/g, the solute would move with ground water, i.e., the solute would be very mobile. A large value of K_d would denote that the solute is essentially immobile, i.e., it would be sorbed on the sediment particles.

A term to better quantify the effect of sorption in relation to groundwater flow is the retardation factor, RF:

$$RF = 1 + (\rho_b/n)K_d \quad (1)$$

where ρ_b is the bulk mass density of the soil and n is the porosity (Freeze and Cherry 1979). To obtain general values for the Hanford Site, typical values of ρ_b and n are 1.65 g/cm^3 and 0.35, respectively. Therefore a reasonable relationship for the Hanford Site would be

$$RF = 1 + 4.7K_d \quad (2)$$

Equation 2 may be interpreted as follows: if K_d = 0 mL/g, then RF = 1 and the solute is not retarded, i.e., it moves at the same velocity as the ground water; if K_d = 1 mL/g, then RF = 5.7 and the solute is retarded relative to the ground-water velocity by a factor of 5.7. The larger the value of RF, the greater the retardation of the solute because of sorption on the sediment particles.

The distribution coefficient is a function of the ion involved, the mineralogy of the sediments, and the chemistry of the solution. For example, tritium and nitrates are considered mobile because neither is sorbed by the soil, while plutonium is readily absorbed on sediments and is immobile.

Dispersion is the process whereby individual contaminant particles are spread out along the flow path because of sediment particles that serve as obstacles to flow. Dispersion is primarily a mechanical process.

The process of dilution occurs when water containing contaminants encounters volumes of cleaner water and the combination of the two waters results in a decrease in contaminant concentration.

The concentration of radioactive contaminants in a plume may be reduced over time by the natural decay of the radioisotopes. The half-life of a radioisotope is the time required for a quantity of radioactive material to decay to one-half of its activity. The concentration of a radioisotope will be reduced to one percent of the original concentration in less than 7 half-lives.

The attenuation mechanisms of sorption, dispersion, dilution, and radioactive decay serve as controls for the radionuclides disposed to the sediments at Hanford. Thus, concentrations of contaminants at any downgradient location are lower than when disposed in a liquid waste site.

2.0 SEPARATIONS AREA GROUND-WATER MONITORING PROGRAM

The ground-water monitoring network was established to observe the radiological quality of the ground water beneath waste storage and disposal facilities in the Separations Area. The network is composed of one or more wells located downgradient from active and inactive waste sites. Two primary concerns in the operation of the monitoring program are the collection of representative ground-water samples and the identification of any condition that could enhance the migration of contaminants.

2.1 WELL NETWORK

There were 127 wells in the routine unconfined aquifer water quality monitoring network for CY 1985, the same as in 1984 (Law et al. 1986, appendix B.1). One monitoring well was added and one deleted from the network in 1985 (table 1). Four new monitoring wells were constructed during the year for use in special sampling at the 216-U-1/2 Cribs (table 2). A brief discussion of the well numbering and facility numbering systems is presented in appendix A, in addition to a map identifying the perimeter of the Separations Area as used in this report, and maps showing well locations.

Monitoring wells are constructed of carbon steel casing and are normally 6 or 8 in. (15.2 or 20.3 cm) in diameter. All new wells are grout sealed in a manner similar to that described in section 2.1.1 to prevent possible migration of contaminants down the outside of the well casing. Older wells are perforated and newer wells screened in the upper 30 to 40 ft (9 to 12 m) of the aquifer to collect water from the surrounding formation.

2.1.1 Well Renovation

To ensure the integrity of wells, a program of well renovation was continued in 1985. This work addresses older wells that are not adequately sealed and are located within 300 ft (91 m) of liquid waste disposal sites. Without the protection of an adequate seal at the surface and between the casing and sediments, voids around the well casing can provide a possible pathway for surface or subsurface contamination to reach the ground water. Eleven wells were renovated in CY 1985 (table 3).

The renovation process is comprised of three steps (fig. 3). First, the existing casing is perforated to a depth of at least 100 ft (30 m). Second, a liner casing of smaller diameter is placed into the well. The bottom end of the liner contains a packer, and is flared to be flush with the outer casing to reduce the probability of pumps or down-hole tools catching on the lip during removal from the well. Finally, the annulus between the well and liner casings is pressure grouted. The perforations in the old casing allow the grout to flow into any voids surrounding the well, thus reducing the possibility of contaminant migration down the outside casing of the well.

Table 1. List of Changes to Routine Well Monitoring Network in CY 1985.

Existing wells added		Wells deleted	
Well no.	Waste site	Well no.	Waste site
299-E28-9	216-B-12	299-W23-4	216-S-21

Table 2. List of New Wells for Special Monitoring in CY 1985.

Well no.	Waste site
299-W19-15	216-U-1/2
299-W19-16	216-U-1/2
299-W19-17	216-U-1/2
299-W19-18	216-U-1/2

Table 3. List of Wells Renovated in CY 1985.

299-E13-1	299-E13-6	299-W19-3
299-E13-3	299-E24-3	299-W19-9
299-E13-4	299-E24-4	299-W19-11
299-E13-5	299-E24-5	

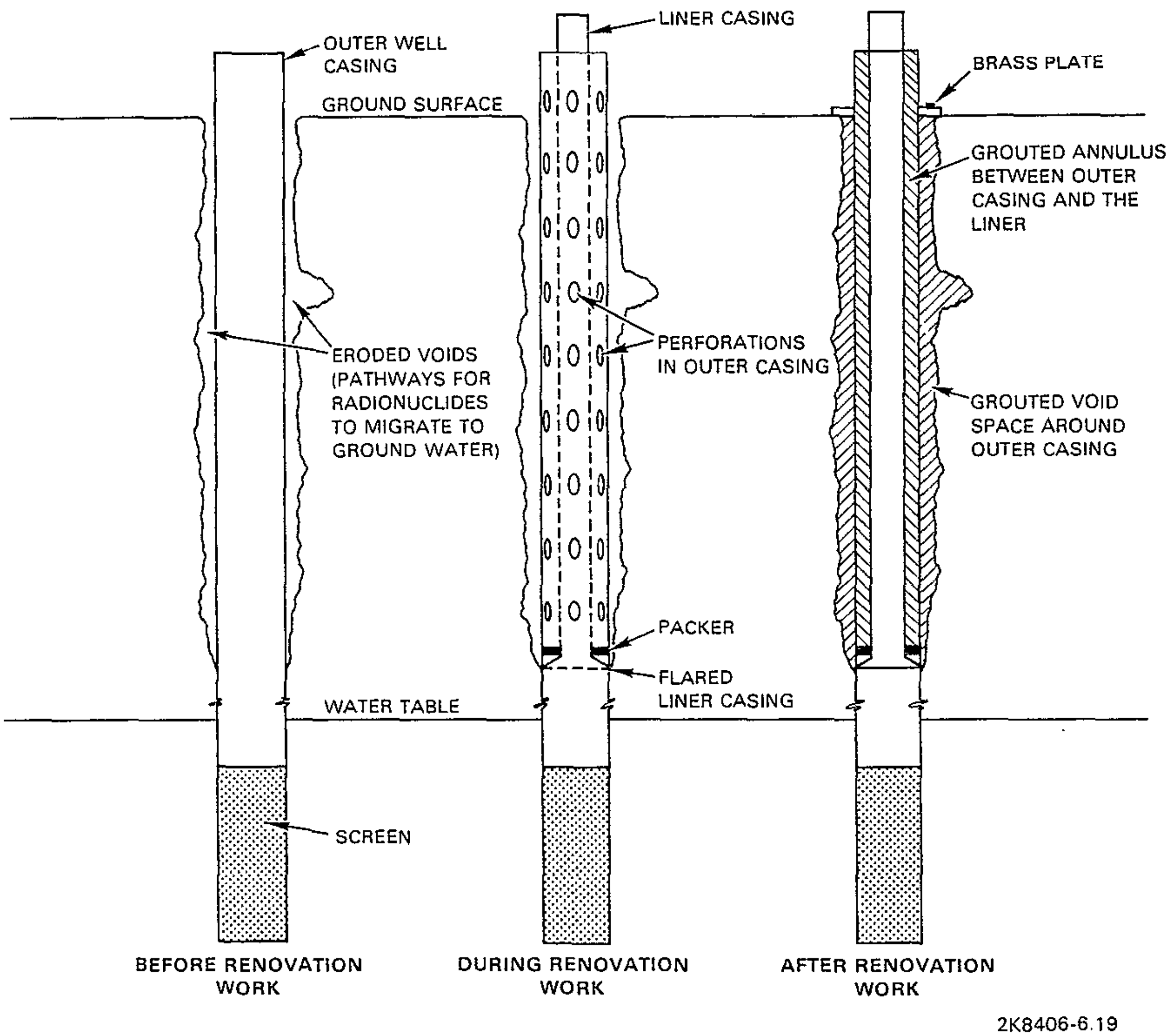

Figure 3. Idealized Cross-Sectional Views of a Well Casing Depicting the Renovation of a Well.

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Wells that have undergone renovation work are fitted with a cement collar at the ground surface. A brass plate bearing the well number is embedded in the collar to prevent misidentification.

2.2 SAMPLING

The following criteria are used to determine sampling frequencies.

- Wells monitoring active liquid waste disposal sites are sampled monthly.
- Wells monitoring inactive liquid waste disposal sites that contain radionuclides with a high potential for being remobilized are sampled monthly.
- Wells monitoring inactive liquid waste disposal sites that contain radionuclides with a low potential for being remobilized are sampled monthly or quarterly, depending upon the level and trend of concentration.
- Wells yielding samples indicating background concentrations are sampled semiannually.

Samples are collected by PNL according to the sampling schedule listed in appendix C.

Monitoring wells with dedicated sampling pumps are pumped to remove stagnant water from the well before a sample is collected (fig. 4). Wells which do not produce enough water to support a pump are sampled by bailing.

2.3 ANALYSES

The samples are analyzed selectively for the following constituents: total alpha, total beta, tritium, uranium, ^{90}Sr, ^{137}Cs, ^{60}Co, ^{106}Ru, and nitrate. The constituent analyses conducted for each well are listed in appendix C. The selection of these parameters is based on the waste disposal history of each site. The analyses are performed by U.S. Testing in accordance with their procedures (U.S. Testing 1980).

2.4 WATER-LEVEL MEASUREMENTS

Water-level measurements are made in approximately 224 shallow wells to produce water table maps of the Hanford Site and the Separations Area. The water table maps of the Hanford Site are constructed semiannually; Plate 1 (in packet) is the water table map for December 1985. The water table map of the Separations Area (see fig. 2) is produced annually.

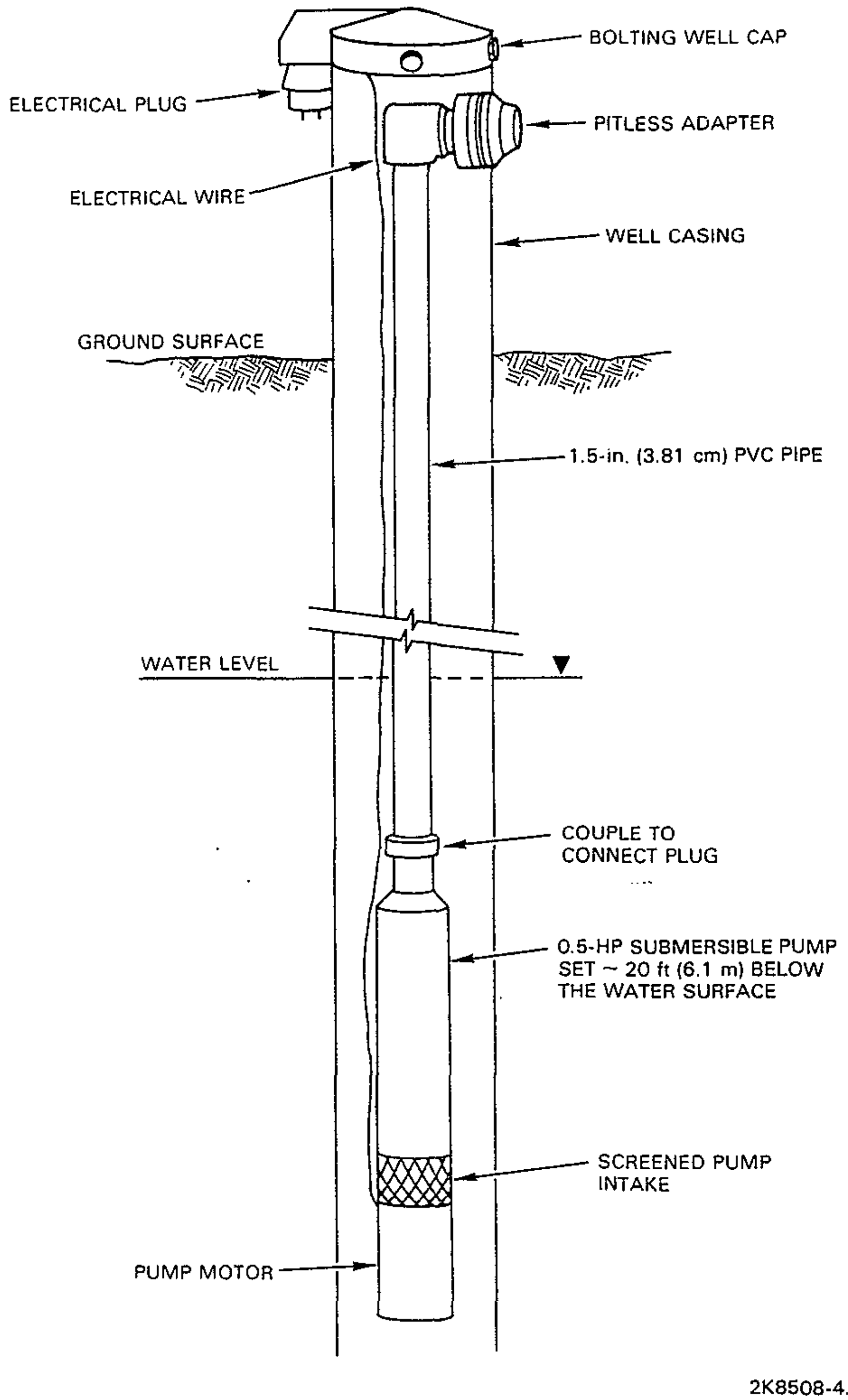

Figure 4. Cross-Sectional View of a Ground-Water Monitoring Well with Pump.

2.5 DATA INTERPRETATION, REPORTING, AND STORAGE

Data are received from the laboratory in the form of a computer printout. The data are reviewed in the context of the concentration history of the well to establish the validity, and are also examined for trends that may suggest modification of the sampling frequency or require other action. The data are stored in the PNL Hanford Ground-Water Data Base for retrieval.

The radionuclide data are compared with RHO-MA-139 guidelines (Rockwell internal guidelines). These guidelines are listed in table 4. The RHO-MA-139 guidelines, which are applicable at each waste disposal site, have been established with the goals of minimizing contaminants in the ground water in order to attain ALARA dose rates and meeting drinking water standards at the end of institutional control, assumed to be in 300 years for the purpose of ground-water monitoring.

When there is little or no measurable radioactivity, the background activity of the counting instrument may be greater than the activity of the sample, resulting in negative analytical values. Following DOE guidance (ERDA 1977), these negative numbers are maintained in the computation of average concentrations.

Uranium is measured chemically in the laboratory and represents the combination of ^{234}U, ^{235}U, and ^{238}U. The uranium is reported in chemical units (μg/L) for the routine monitoring results. For special sampling cases, uranium may be converted to units of radioactivity (pCi/L) on the bases of isotopic uranium analyses of ground-water samples. This conversion factor is 0.679 pCi/μg. In some cases, isotopic uranium is determined and then reported by isotope.

Nitrate is treated as a tracer because of its mobility in ground water. The nitrate concentrations are compared with U.S. Environmental Protection Agency (EPA) drinking water standards (EPA 1976) of 45 mg/L, reported as nitrate, for reference purposes only. These drinking water standards are not applicable to the Hanford Site because there is no public drinking water supply.

2.6 QUALITY ASSURANCE

Quality assurance is included in all aspects of the monitoring program: well maintenance; sampling; analytical procedures; and data interpretation, storage, and reporting. A quality control plan is in place and is being administered. The monitoring program is subject to external audits by the Rockwell Quality Program Assessment Group and to internal audits by the Rockwell Environmental Engineering Unit.

Table 4. Rockwell Radionuclide Concentration Guidelines.

Radionuclide	RHO-MA-139 concentration guideline[a] (pCi/L)
Tritium (^{3}H)	b
^{60}Co	3.0 E+04
^{90}Sr	3.0 E+01
^{99}Tc	2.0 E+05
^{106}Ru	1.0 E+04
^{129}I	6.0 E+01
^{137}Cs	2.0 E+03
^{234}U	3.2 E+01
^{235}U	3.2 E+01
^{238}U	4.8 E+00[c]

[a]RHO-MA-139, section L.30 (C).

[b]Annual tritium discharge to ground water from Rockwell facilities shall not exceed 2.0 E+05 Ci.

[c]For the isotopic composition of uranium in ground water in the Separations Area, the equivalent concentration of total uranium is 9.84 pCi/L.

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3.0 ACTIVE DISPOSAL SITES

This section reports the results of the ground-water monitoring program at active liquid waste disposal sites in CY 1985.

Low-level radioactive liquid wastes generated in the processing facilities in the 200 Areas are discharged to ground for disposal. Cooling water is disposed to surface ditches and ponds. Other liquid wastes containing low-level radioactive constituents are disposed to subsurface facilities designated as cribs. Ground-water monitoring near surface ponds is discussed in section 3.1; monitoring near subsurface facilities is discussed in section 3.2.

RHO-MA-139 limits the release of tritium in liquid waste streams from plant facilities to 2.0 E+05 Ci (table 3). During 1985, a total of 1.09 E+04 Ci of tritium were released from Rockwell facilities (Aldrich 1986).

3.1 SURFACE LIQUID DISPOSAL SITES

Two major ponds were in operation during 1985 for the disposal of waste water, primarily cooling water: 216-A-25 (Gable Mountain Pond) and 216-B-3 (B Pond). The locations of these ponds are shown in figure 2.

In the 200 East Area in 1985, a total of 5.49 E+09 gal (2.08 E+10 L) of liquid effluent was discharged to ponds from the following effluent streams:

- PUREX Cooling Water (CWL)
- B Plant Cooling Water (CBC)
- 242-A Evaporator Cooling Water (ACW)
- 242-A Evaporator Steam Condensate (ASC)
- 244-AR Vault Cooling Water (CAR)
- 241-A Tank Farm Cooling Water (CA8)
- PUREX Chemical Sewer (CSL).

These streams can be routed to either Gable Mountain or the B Pond system, with the exception of the CSL effluent stream, which goes directly to B Pond.

Several minor surface liquid waste disposal facilities which receive low volumes of effluent are not discussed: the 216-B-63 trench in 200 East Area, which receives B Plant Chemical Sewer effluent; the 216-S-10 ditch for the REDOX bearing cooling water; the 216-T-1 ditch, which receives waste from the T Plant drain flush and headend wastes; and the 216-T-4-2 ditch and 216-T-4 pond, which receive chemical drain compressor wastes from the 221-T and 224-T Buildings.

3.1.1 216-A-25 (Gable Mountain) Pond

Gable Mountain Pond, consisting of a main pond and an overflow pond totaling about 48 acres (19 ha), is located north of 200 East Area and south of Gable Mountain (see fig. 2). The area of the main pond has been reduced approximately by half during 1984 and 1985 in preparation for planned future deactivation. The Gable Mountain Pond received an estimated volume of 2.1 E+09 gal (7.9 E+09 L) of effluent during 1985, a 20% reduction from the 2.6 E+09 gal (9.92 E+09 L) of effluent disposed there in 1984.

The 1984 ground-water monitoring report (Law et al. 1986) discussed elevated concentrations of ^{90}Sr in monitoring wells near the pond. The pond received ^{90}Sr in 1964 when a cooling coil broke in PUREX. In-plant monitoring and automatic diversion are now in place to preclude such a release.

When the concentration of ^{90}Sr exceeded Rockwell guidelines in well 699-53-47A in 1984, five other wells were drilled as part of an investigation. Well 699-53-47B, adjacent to well 699-53-47A, has similar concentrations of ^{90}Sr, while well 699-53-48B has higher concentrations. Concentrations of ^{90}Sr in the other three wells were below Rockwell guidelines. Samples were also taken from three existing downgradient wells which did not exhibit any elevated concentrations, indicating the contamination was localized. The investigation also indicated, using conservative assumptions, the travel time to the Columbia River for ^{90}Sr would be approximately 5,000 yr. The 1984 worst condition of 906 pCi/L would reduce to 7 pCi/L in 7 half-lives, or 197 yr, by radioactive decay alone, without considering dispersion of the ^{90}Sr.

During 1985, routine monitoring was conducted in six near-field wells and six downgradient wells (fig. 5). Concentrations of radioactive constituents are summarized in table 5. Concentrations of constituents are within Rockwell guidelines, with the exception of ^{90}Sr in the three wells previously noted: 699-53-47A, 699-53-47B, and 699-53-48B. Figure 6 illustrates a slight downward trend in ^{90}Sr in well 699-53-47A. A more significant decline is observed in well 699-53-48B where the ^{90}Sr concentration is approaching one-third of its maximum observed level (fig. 7). Concentrations of ^{90}Sr in well 299-53-47B remained uniform during the year and averaged 6.95 E+01 pCi/L.

3.1.2 216-B-3 (B Pond) System

The B Pond system is composed of the 34-acre (14 ha) main pond, 216-B-3; two 11-acre (4 ha) expansion ponds, 216-B-3A and 216-B-3B; and a third expansion pond of 41 acres (17 ha), 216-B-3C. The total capacity was not completely used in 1985, when the B Pond system received an estimated 3.9 E+09 gal (1.5 E+10 L) of effluent in 1985.

The pond system is monitored by wells 699-42-40A and 699-42-40B (fig. 2). Concentrations of radionuclides, listed in table 6, are below Rockwell guidelines and similar to 1984 results.

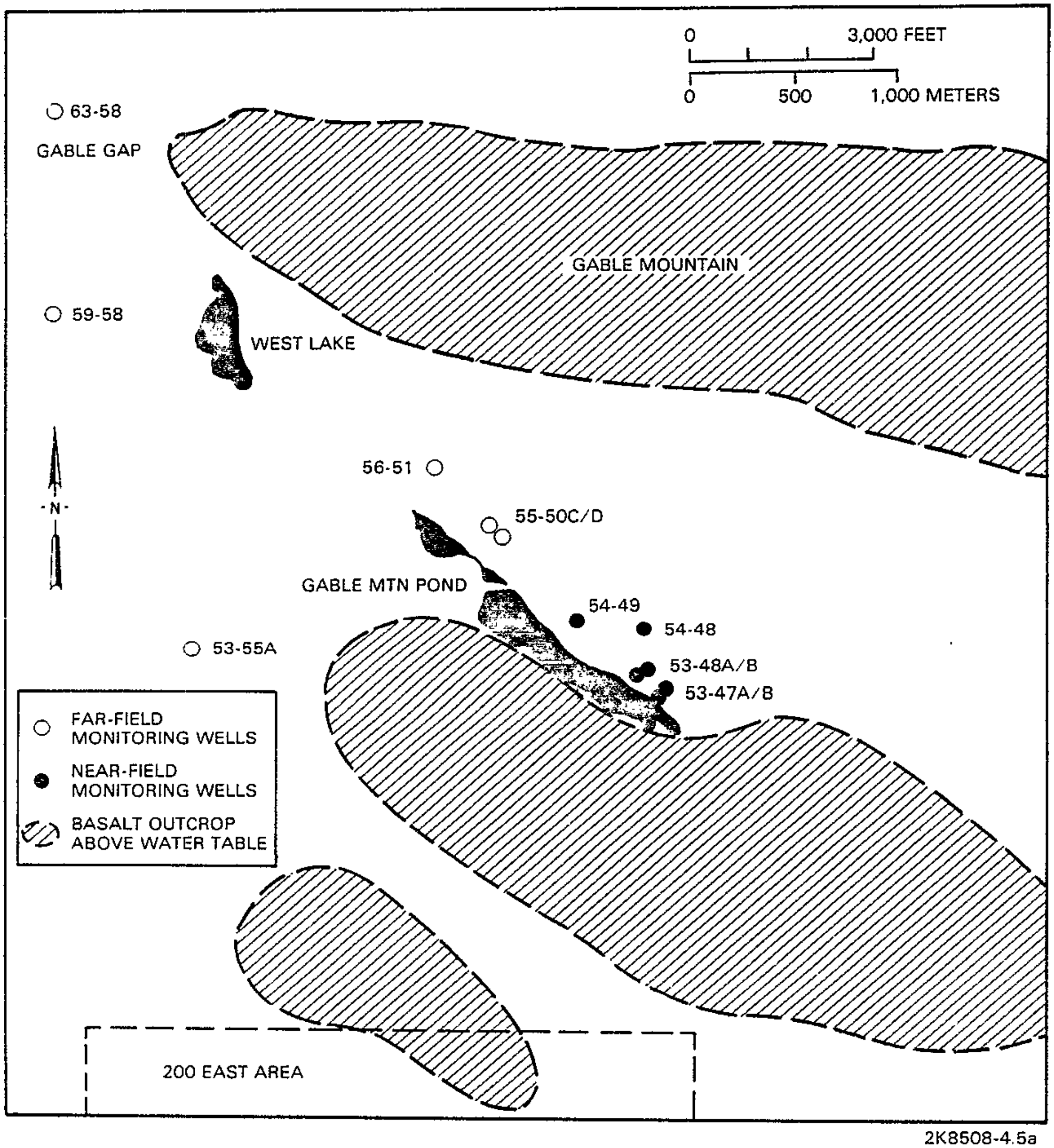

Figure 5. Gable Mountain Pond and Vicinity.

9 2 1 2 4 5 5 1 9 7 2

Table 5. Concentrations of Radiological Constituents and Nitrate in Ground Water Near the 216-A-25 (Gable Mountain) Pond in 1985. (sheet 1 of 2)

Well No.		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (mg/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (μg/L)
	MAX[a]	3.03 E+00	1.61 E+02			8.24 E+01	5.11 E+00	3.04 E+00	2.67 E+01	
6-53-47A	AVE[b]	1.42 E+00	1.19 E+02	NN[d]	NN	6.28 E+01	1.27 E+00	7.17 E-02	-1.06 E+01	NN
	MIN[c]	1.97 E-01	7.38 E+01			3.64 E+01	-2.88 E+00	-5.57 E+00	-6.54 E+01	
	MAX	2.71 E+00	1.67 E+02			7.84 E+01	2.49 E+00	7.09 E+00	3.28 E+01	
6-53-47B	AVE	2.01 E+00	1.32 E+02	NN	NN	6.95 E+01	-5.44 E-01	1.02 E+00	-7.90 E+00	NN
	MIN	1.05 E+00	1.09 E+02			6.27 E+01	-4.63 E+00	-5.65 E+00	-7.68 E+01	
	MAX	1.40 E+01	1.14 E+01			6.50 E+01	6.88 E+00	3.38 E+00	7.03 E+01	1.33 E+01
6-53-48A	AVE	6.40 E+00	8.68 E+00	NN	NN	7.52 E+00	-3.26 E-01	-1.36 E+00	3.12 E+00	1.33 E+01
	MIN	4.19 E-01	6.41 E+00			3.64 E-02	-6.39 E+00	-1.69 E+01	-5.35 E+01	1.33 E+01
	MAX	2.20 E+00	1.37 E+03			8.98 E+02	4.99 E+00	6.04 E+00	7.73 E+01	
6-53-48B	AVE	5.14 E-01	8.05 E+02	NN	NN	5.29 E+02	-1.38 E-01	8.62 E-02	1.07 E+01	NN
	MIN	8.86 E-02	7.84 E+00			3.40 E+02	-1.01 E+01	-8.28 E+00	-3.25 E+01	
	MAX	1.47 E+00	4.82 E+01			8.87 E-01	5.16 E+00	5.66 E+00	7.03 E+01	
6-53-55A	AVE	7.58 E-01	1.50 E+01	NN	NN	1.16 E-01	3.29 E-01	2.49 E+00	9.22 E-01	NN
	MIN	4.23 E-01	7.64 E+00			-4.33 E-01	-5.34 E+00	-5.65 E+00	-6.74 E+01	
	MAX	1.91 E+00	4.04 E+01		1.97 E+00	2.90 E+01	4.48 E+00	9.70 E+00	9.40 E+01	
6-54-48	AVE	1.08 E+00	2.58 E+01	NN	1.97 E+00	1.32 E+01	-3.13 E+00	-5.13 E-01	1.79 E+01	NN
	MIN	4.68 E-01	1.54 E+01		1.97 E+00	6.77 E+00	-1.01 E+01	-7.88 E+00	-2.06 E+01	
	MAX	1.78 E+00	7.52 E+01			2.86 E+01	1.73 E+00	-1.74 E+00	0.00 E+00	
6-54-49	AVE	1.06 E+00	3.52 E+01	NN	NN	1.61 E+01	3.30 E-01	-6.42 E+00	-2.39 E+01	NN
	MIN	4.41 E-01	1.46 E+01			6.57 E+00	-1.07 E+00	-1.11 E+01	-4.78 E+01	
	MAX	1.32 E+00	6.89 E+00			1.43 E+00				
6-55-50C	AVE	9.23 E-01	5.09 E+00	NN	NN	5.89 E-01	NN	NN	NN	NN
	MIN	5.00 E-01	3.32 E+00			1.92 E-01				

Table 5. Concentrations of Radiological Constituents and Nitrate in Ground Water Near the 216-A-25 (Gable Mountain) Pond in 1985. (sheet 2 of 2)

Well No.		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (mg/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (µg/L)
	MAX	1.87 E+00	7.51 E+00			1.16 E+00				
6-55-50D	AVE	1.87 E+00	7.51 E+00	NN	NN	1.16 E+00	NN	NN	NN	NN
	MIN	1.87 E+00	7.51 E+00			1.16 E+00				
	MAX	1.13 E+00	4.10 E+00	1.37 E+02	3.98 E+00	9.83 E-01				
6-56-51	AVE	6.96 E-01	3.52 E+00	1.37 E+02	3.98 E+00	4.40 E-01	NN	NN	NN	NN
	MIN	4.23 E-01	2.85 E+00	1.37 E+02	3.98 E+00	1.97 E-01				
	MAX	1.12 E+00	4.65 E+00			1.78 E+00				
6-59-58	AVE	1.12 E+00	4.65 E+00	NN	NN	5.79 E-01	NN	NN	NN	NN
	MIN	1.12 E+00	4.65 E+00			-1.90 E-01				
	MAX	1.17 E+00	4.12 E+00			6.88 E-01				
6-63-58	AVE	9.91 E-01	4.05 E+00	NN	NN	4.21 E-01	NN	NN	NN	NN
	MIN	8.12 E-01	3.99 E+00			1.47 E-01				

[a]Maximum.
[b]Average.
[c]Minimum.
[d]Analyses not necessary (as determined from inventory, effluent history, or gross alpha/beta analyses).

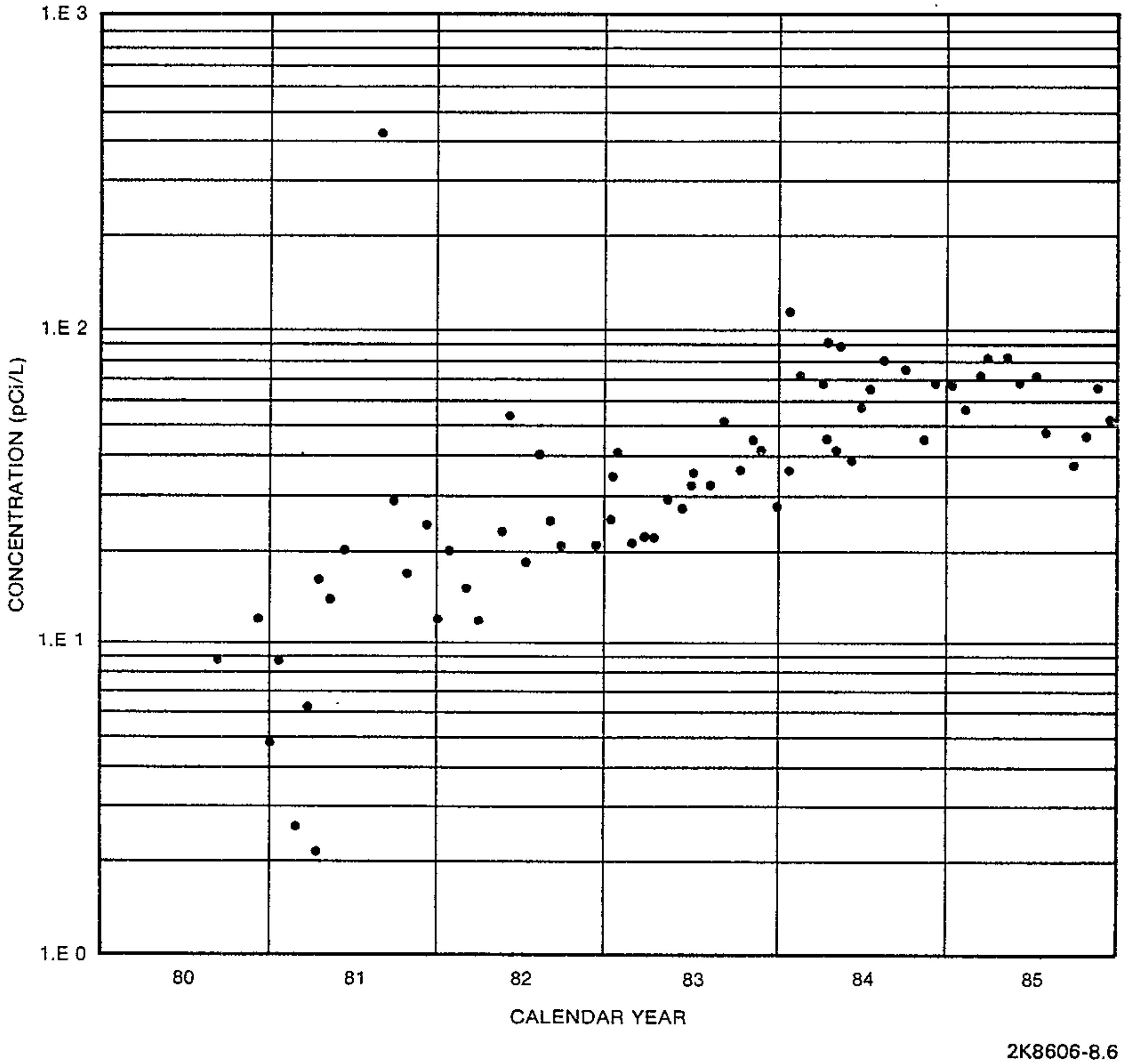

Figure 6. Concentration History of ^{90}Sr in Well 699-53-47A.

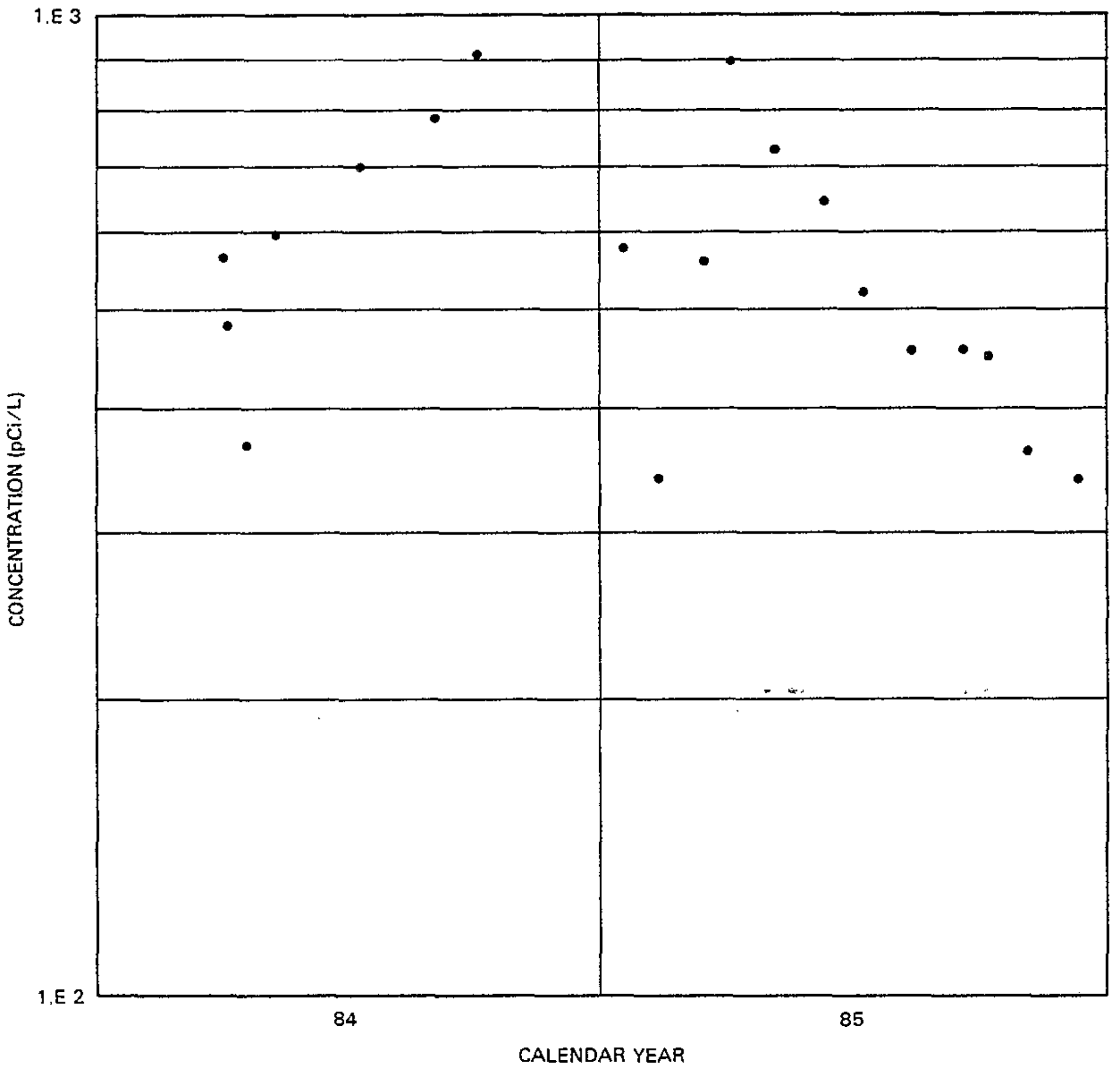

Figure 7. Concentration History of ^{90}Sr in Well 699-53-48B.

Table 6. Concentrations of Radiological Constituents and Nitrate in Ground Water Near the 216-B-3 (B Pond) System in 1985.

Well No.		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (mg/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium ($\mu g/L$)
	MAX[a]	2.12 E+00	5.92 E+00	1.32 E+04	1.70 E+01	1.77 E+00	5.11 E+00	7.91 E+00	2.32 E+01	2.23 E+00
6-42-40A	AVE[b]	9.07 E-01	4.20 E+00	2.53 E+03	5.64 E+00	3.62 E-01	-1.00 E+00	2.39 E+00	-7.09 E+00	9.86 E-01
	MIN[c]	4.90 E-02	1.18 E+00	2.73 E+02	6.42 E-01	-5.91 E-01	-1.78 E+01	-7.85 E+00	-6.46 E+01	-3.98 E-01
	MAX		4.25 E+00	6.46 E+01		3.97 E-01	-7.12 E-01	0.00 E+00	-8.98 E+00	
6-42-40B	AVE	NN[d]	4.25 E+00	6.46 E+01	NN	3.97 E-01	-7.12 E-01	0.00 E+00	-8.98 E+00	NN
	MIN		4.25 E+00	6.46 E+01		3.97 E-01	-7.12 E-01	0.00 E+00	-8.98 E+00	

[a]Maximum.
[b]Average.
[c]Minimum.
[d]Analyses not necessary (as determined from inventory, effluent history, or gross alpha/beta analyses).

3.2 SUBSURFACE LIQUID DISPOSAL SITES

Low-level radioactive liquid wastes from processing operations are disposed to subsurface cribs. A typical crib (fig. 8) consists of a long, trapezoidal, rock-filled trench covered with a sheet of plastic and several feet of backfill. A perforated distributor pipe disperses the waste throughout the length of the crib. Vents are placed to allow gases to escape, and liquid-level gauges are emplaced to evaluate the functioning of the crib.

There were 13 effluent streams in 1985 discharging to 14 active cribs, as indicated in table 7. Ground-water samples were collected from monitoring wells near these active crib sites (crib locations are shown in fig. 9 and 10).

In the following discussions of the specific sites, the average, maximum, and minimum concentrations of constituents are tabulated for each ground-water monitoring well. Nitrate results are reported in terms of nitrate, rather than nitrogen. For comparison, the drinking water standard for nitrate is 45 ppm when reported as nitrate versus 10 ppm when reported as nitrogen. The 1985 results are also compared with 1984 results (Law et al. 1986).

To provide perspective, the concentrations of radionuclides in the effluent streams reported in Boothe et al. (1986) are included in the table for each waste site.

Graphs depicting long-term concentration histories of selected constituents in the effluent stream and monitoring wells are presented in appendix D for cribs receiving waste water from the 202-A Building (PUREX) and associated facilities, and the 221-B Building (B Plant). Effluent concentrations are shown on the concentration history graphs only for years that disposal occurred. Ground-water data points are shown for all years that data are available. Consecutive years are connected by a solid line, while a dashed line is drawn between data points when there is no data for the intervening years.

3.2.1 216-A-8 Crib

The 216-A-8 crib receives condensate waste (A8) from the 241-AY, -AZ Tank Farms. The crib is located east of the 241-AX Tank Farm outside the 200 East Area perimeter fence (see fig. 9). The crib was in operation during 1955 to 1958, 1966 to 1976, 1978, and 1983 through 1985. The crib received 6.10 E+04 gal (2.31 E+05 L) of effluent during 1985.

Wells 299-E25-6 and 299-E25-9 monitor this crib. Average concentrations of ^{90}Sr, ^{137}Cs, ^{60}Co, and ^{106}Ru are below RHO-MA-139 guidelines. The concentrations determined in 1985 (see table 8) were similar to the results for 1984.

9 2 1 2 1 5 6 1 9 7 9

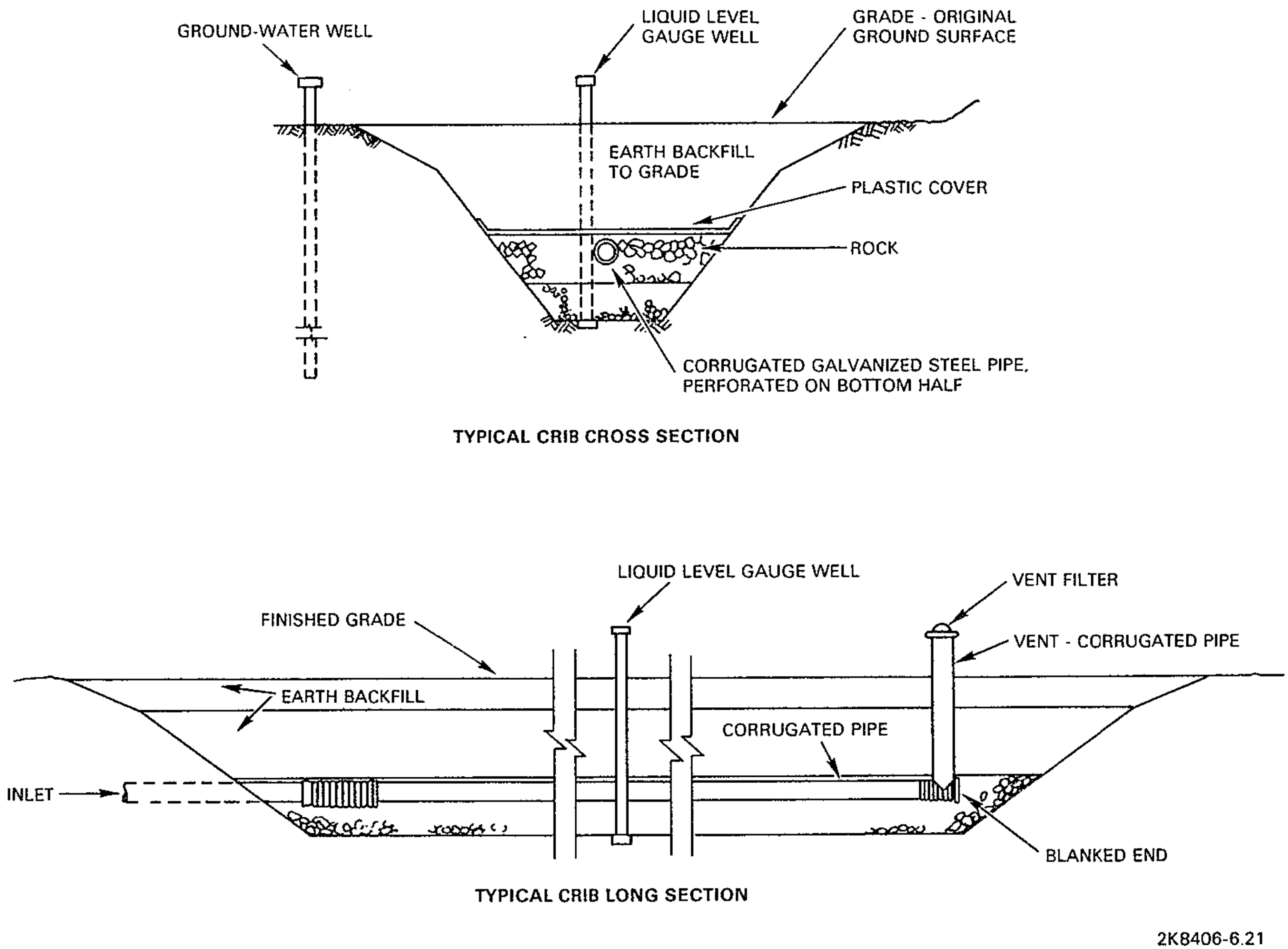

Figure 8. Typical Subsurface Liquid Waste Disposal Crib.

Table 7. Active Cribs in CY 1985.

Crib	Description of waste
216-A-8	241-A, AX, AY Tank Farms Steam Coil Condensate (A8)
216-A-10	PUREX Process Condensate (PDD)
216-A-30 216-A-37-2	PUREX Steam Condensate (SCD)
216-A-36B	PUREX Ammonia Scrubber Waste (ASD)
216-A-37-1	242-A Evaporator Process Condensate (AFPC)
216-B-55	B Plant Steam Condensate (BCS)
216-B-62	B Plant Process Condensate (BCP)
216-U-12	UO_3 Plant Process Condensate (U-12)
216-U-16	UO_3 Plant Steam Condensate, Cooling Water, and Chemical Sewer
216-W-LWC	Laundry Waste Water (LWC)
216-Z-20	Waste Water from 231-Z and 234-5Z (231-Z and 2904-ZA)
216-S-25	Effluent from Ion Exchange Column, 242-S Evaporator
216-S-26	Waste Water from 222-S Laboratory

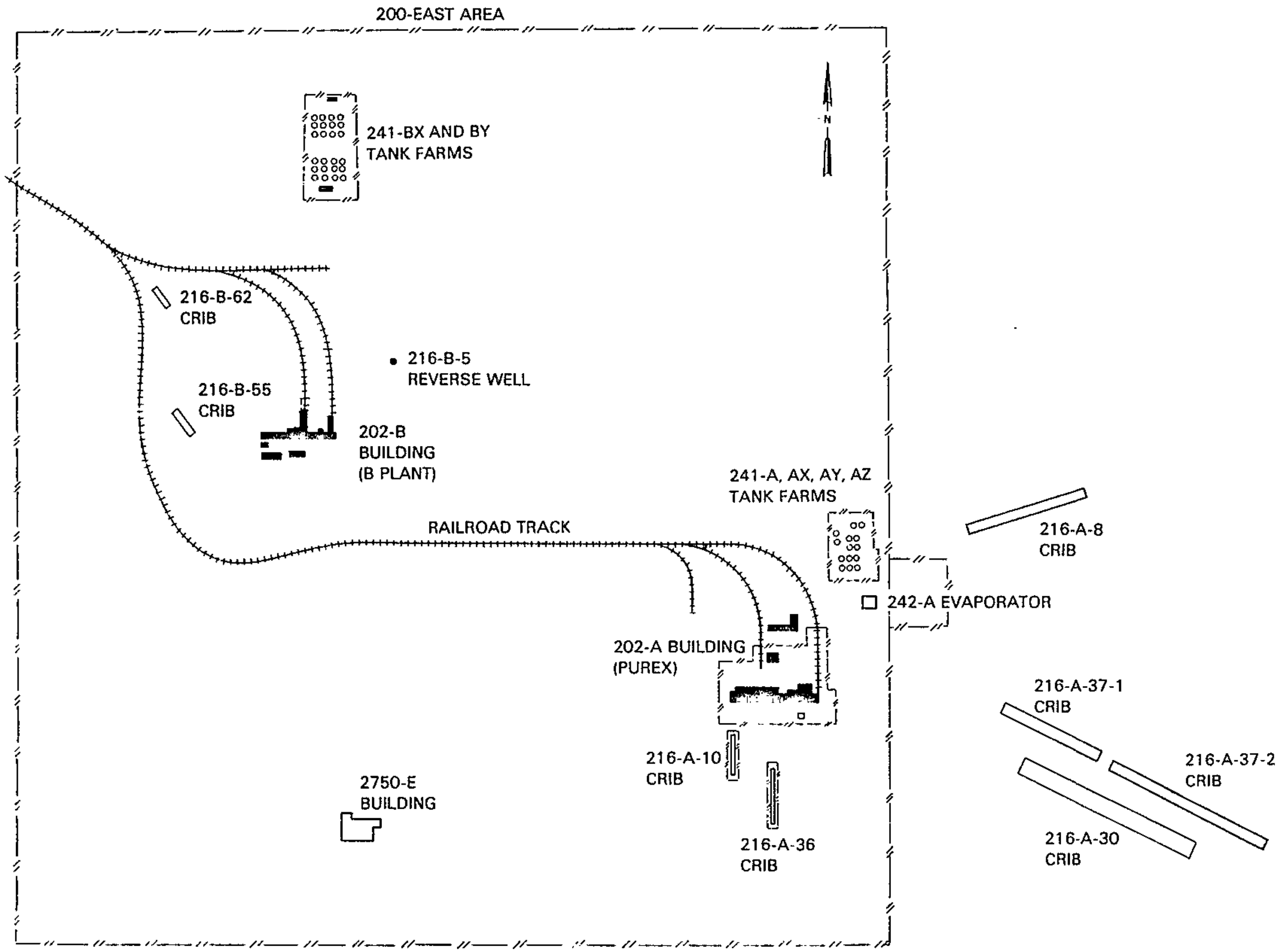

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Figure 9. Location Map for Selected Liquid Waste Disposal Sites in 200 East Area.

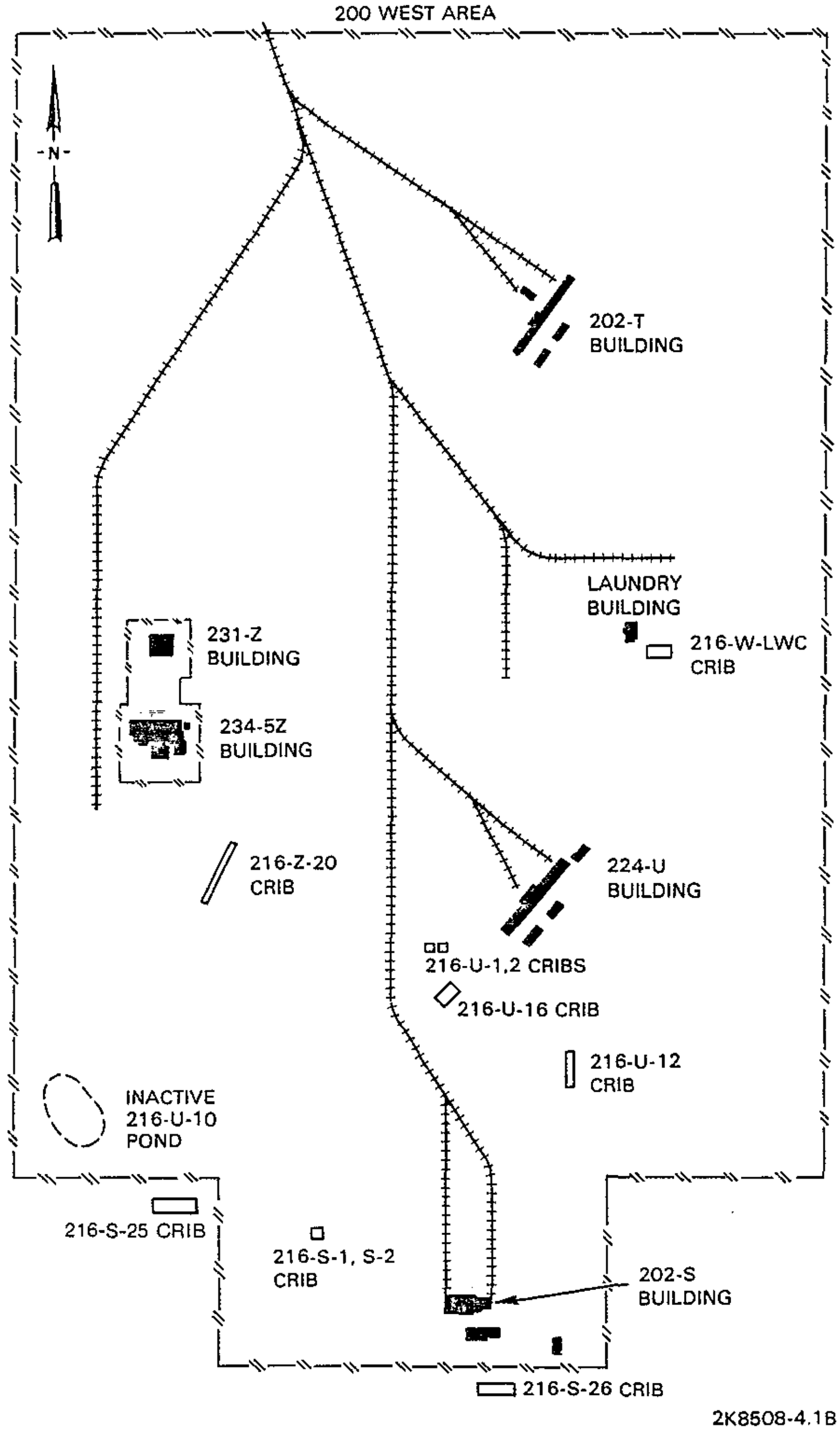

Figure 10. Location Map for Selected Waste Disposal Sites in 200 West Area.

Table 8. Concentrations of Radiological Constituents and Nitrate for the Effluent and for Ground Water Near the 216-A-8 Crib in 1985.

		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (mg/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (μg/L)
						Effluent				
AY, AZ (A-8)	AVE[a]	3 E+01	2 E+05	BDL[b]	NA[c]	6 E+03	1 E+05	NA	NN[d]	1 E+02
						Wells				
2-E25-6	MAX[e]	2.38 E+00	1.20 E+01	2.02 E+04	3.52 E+00	9.71 E-01	4.82 E+00	6.77 E+00	5.93 E+01	NN
	AVE	1.45 E+00	5.95 E+00	1.25 E+04	1.94 E+00	3.06 E-01	-8.07 E-01	1.32 E+00	5.02 E-01	
	MIN[f]	9.08 E-01	3.71 E+00	6.55 E+03	9.34 E-01	-5.85 E-01	-5.92 E+00	-7.85 E+00	-9.25 E+01	
2-E25-9	MAX	1.40 E+00	5.06 E+01	8.35 E+03	3.35 E+00	1.96 E+00	5.75 E+00	5.06 E+00	5.47 E+01	NN
	AVE	7.50 E-01	8.10 E+00	4.54 E+03	2.78 E+00	4.44 E-01	6.94 E-01	9.60 E-01	-6.75 E+00	
	MIN	2.25 E-01	2.70 E+00	2.41 E+02	2.34 E+00	-2.02 E-01	-6.07 E+00	-1.11 E+01	-1.12 E+02	

[a]Average.
[b]Below detection limit.
[c]Not applicable.
[d]Analyses not necessary (as determined from inventory, effluent history, or gross beta/alpha analyses).
[e]Maximum.
[f]Minimum.

Long-term concentration histories for the monitoring wells of 216-A-8 crib are shown on pages D-3 and D-4 in appendix D. Total beta, tritium, and nitrate concentrations for 1985 are in good general agreement with the long-term trend.

3.2.2 216-A-10 Crib

The 216-A-10 crib is located south of PUREX in the 200 East Area (see fig. 9). The crib receives process condensate (PDD) waste from PUREX and was operated from 1961 to 1973, sporadically operated in 1977 and 1978, and was reactivated in 1981. During 1985, 2.69 E+07 gal (1.02 E+08 L) of liquid were discharged to the crib.

The ground water beneath this crib is monitored by wells 299-E17-1 and 299-E24-2. Average concentrations of constituents monitored in these wells are listed in table 9. The radiological parameters of ^{90}Sr, ^{137}Cs, ^{60}Co, and ^{106}Ru are below RHO-MA-139 guidelines. Concentrations of tritium and nitrate have increased during 1985 as depicted in figures 11 and 12, which reflects the operation of PUREX. This increase in tritium was predicted in DOE (1983).

Vadose-zone monitoring well 299-E24-15 failed during the year, allowing the well to fill up with disposed effluent. The well was 160 ft (49 m) deep with the bottom of the well 152 ft (46 m) above the water table. A new vadose-zone well was constructed and well 299-E24-15 was sealed with grout. No increase in concentrations of radionuclides or nitrate has been observed in the ground-water monitoring wells.

Long-term concentration histories for the wells at the 216-A-10 crib are shown on pages D-5 and D-6 in appendix D. The increases in tritium and nitrate due to PUREX operation are apparent, but concentrations are in agreement with the established trend.

3.2.3 216-A-30 Crib and 216-A-37-2 Crib

The 216-A-30 crib and 216-A-37-2 crib, located just east of the 200 East Area (see fig. 9), receive steam condensate (SCD) waste from PUREX. The 216-A-30 crib has been in continuous operation since 1961, with the exception of 1974 and 1975. The 216-A-37-2 crib began operation in 1984 with the restart of PUREX. The SCD waste stream discharged 2.34 E+08 gal (8.83 E+08 L) to these cribs during 1984. About 1.71 E+08 gal (6.47 E+08 L) of the effluent went to the 216-A-30 crib, with the remainder of the effluent, 6.26 E+07 gal (2.37 E+08 L), going to the 216-A-37-1 crib.

The 216-A-30 crib is monitored by wells 299-E16-2 and 299-E25-11. The 216-A-37-2 crib is monitored by four wells, 299-E25-21 through 299-E25-24. Monitoring results for 1985 are listed in table 10. A comparison with results from the previous year indicates that results are similar for the two years. All constituents are below RHO-MA-139 guidelines.

Table 9. Concentrations of Radiological Constituents and Nitrate for the Effluent and for Ground Water Near the 216-A-10 Crib in 1985.

		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (mg/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium ($\mu g/L$)
Effluent										
PUREX (PDD)	AVE[a]	2 E+04	3 E+04	1 E+08	NA[b]	<6 E+01	<6 E+01	NA	3 E+04	<7 E+01
Wells										
2-E17-1	MAX[c]	8.39 E+00	4.55 E+01	5.62 E+06	1.88 E+02	4.23 E+00	5.43 E+00	6.79 E+00	7.05 E+01	NN[e]
	AVE	4.18 E+00	3.47 E+01	2.40 E+06	1.03 E+02	2.96 E+00	1.49 E+00	1.94 E+00	9.21 E+00	
	MIN[d]	8.43 E-01	2.02 E+01	1.15 E+06	6.51 E+01	1.77 E+00	-2.56 E+00	-9.49 E+00	-9.67 E+01	
2-E24-2	MAX	1.54 E+01	5.38 E+01	5.47 E+06	2.61 E+02	2.63 E+00	5.44 E+00	4.14 E+00	4.10 E+01	NN
	AVE	6.72 E+00	3.12 E+01	2.12 E+06	1.16 E+02	1.55 E+00	1.90 E-01	-1.90 E+00	-1.35 E+01	
	MIN	1.49 E+00	9.45 E+00	3.88 E+05	2.34 E+01	4.42 E-01	-2.85 E+00	-9.48 E+00	-1.41 E+02	

[a]Average.
[b]Not applicable.
[c]Maximum.
[d]Minimum.
[e]Analyses not necessary (as determined from inventory, effluent history, or gross alpha/beta analyses).

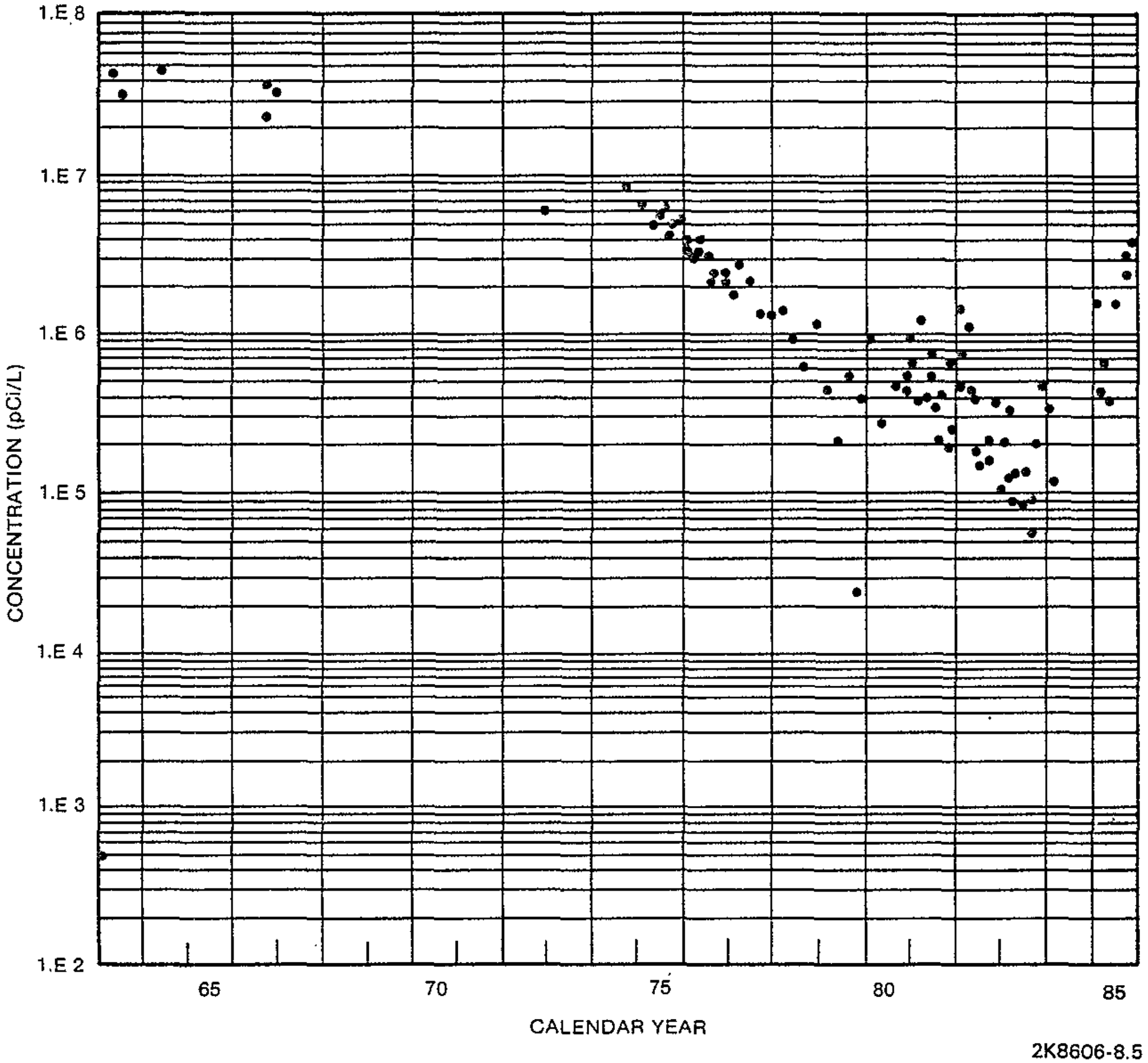

Figure 11. Tritium Concentration History in Well 299-E24-2 at the 216-A-10 Crib.

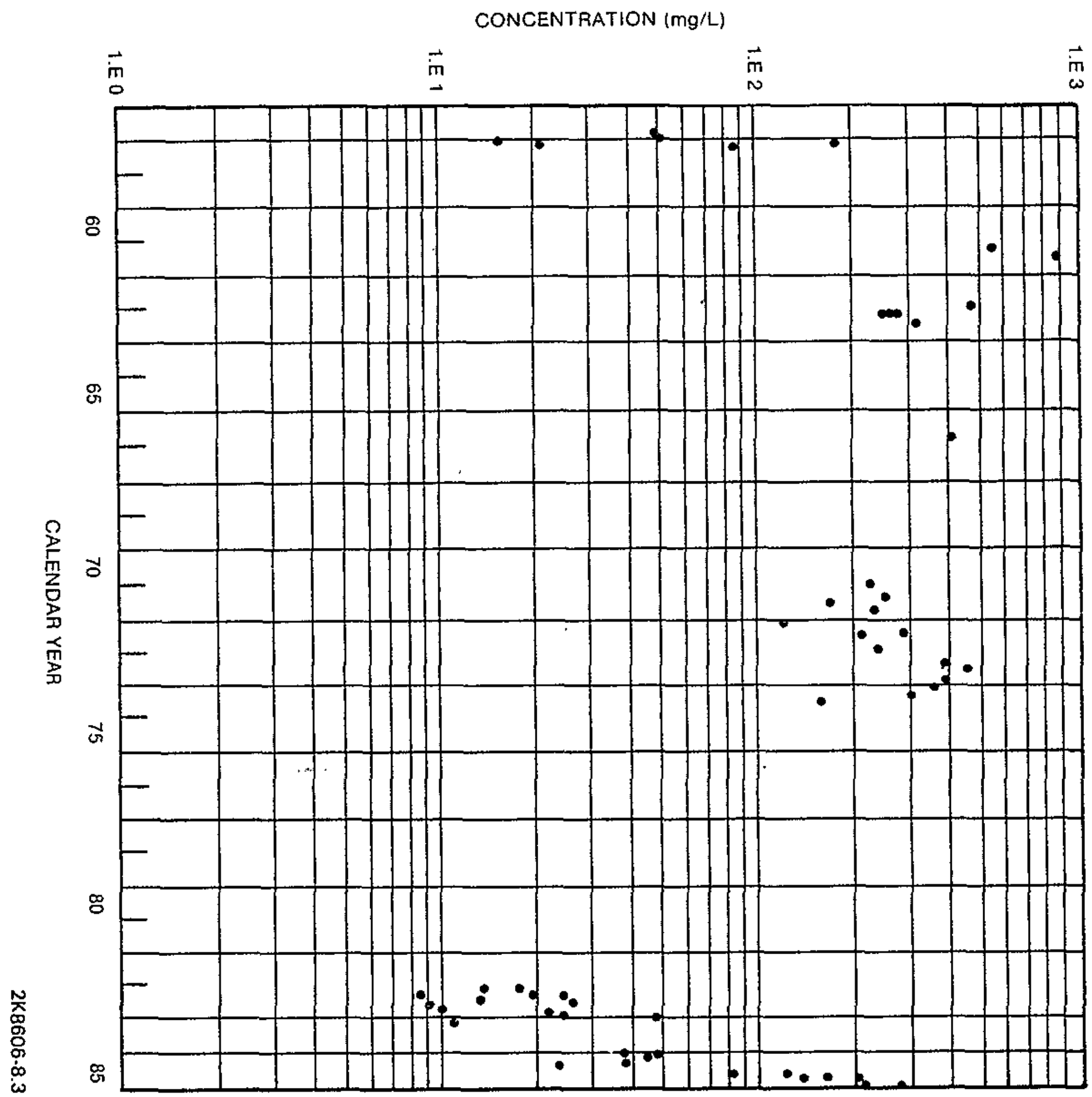

Figure 12. Nitrate Concentration History in Well 299-E24-2 at the 216-A-10 Crib.

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Table 10. Concentrations of Radiological Constituents and Nitrate for the Effluent and for Ground Water Near the 216-A-30 Crib and 216-A-37-2 Crib in 1985.

		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (mg/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (μg/L)
					Effluent					
PUREX (SCD)	AVE[a]	BDL[b]	2 E+03	2 E+04	NA[c]	4 E+02	3 E+02	NA	NN[d]	1 E+01
					Wells at 216-A-30 crib					
2-E16-2	MAX[e]	2.67 E+00	1.16 E+01	2.94 E+03	7.22 E+00	3.51 E-01	7.57 E+00	1.18 E+01	4.26 E+01	NN
	AVE	1.59 E+00	9.58 E+00	7.53 E+02	3.12 E+00	1.42 E-01	1.28 E+00	-7.12 E-01	1.08 E+01	
	MIN[f]	8.66 E-01	7.33 E+00	7.10 E+01	1.05 E+00	-9.03 E-02	-5.16 E+00	-1.60 E+01	-1.74 E+01	
2-E25-11	MAX	NN	9.70 E+00	1.06 E+05	2.32 E+01	6.62 E-01	6.41 E+00	5.63 E+00	5.83 E+01	NN
	AVE		5.57 E+00	4.76 E+04	1.36 E+01	2.53 E-01	9.82 E-01	1.64 E+00	-9.66 E+00	
	MIN		2.69 E+00	1.99 E+04	7.13 E+00	-7.96 E-02	-5.86 E+00	-1.70 E+00	-9.56 E+01	
					Wells at 216-A-37-2 crib					
2-E25-21	MAX	5.14 E+00	2.10 E+01	1.46 E+04	1.22 E+01	1.91 E+00	4.98 E+00	7.27 E+00	7.75 E+01	NN
	AVE	2.61 E+00	1.25 E+01	2.84 E+03	5.23 E+00	3.56 E-01	-7.00 E-01	1.01 E+00	4.01 E+00	
	MIN	9.08 E-01	6.22 E+00	-1.15 E+03	1.32 E+00	-2.42 E-03	-6.97 E+00	-1.69 E+01	-5.39 E+01	
2-E25-22	MAX	2.85 E+00	1.23 E+01	2.02 E+04	4.30 E+01	2.72 E+00	4.15 E+00	7.28 E+00	5.04 E+01	NN
	AVE	1.73 E+00	8.50 E+00	9.32 E+03	9.39 E+00	6.23 E-01	-3.99 E-01	8.17 E-01	1.57 E+00	
	MIN	7.72 E-01	4.67 E+00	4.16 E+03	2.89 E+00	-2.30 E-02	-7.99 E+00	-9.09 E+00	-2.95 E+01	
2-E25-23	MAX	1.05 E+00	1.57 E+01	1.24 E+03	4.20 E+01	1.19 E+00	4.27 E+00	9.72 E+00	8.60 E+01	NN
	AVE	6.19 E-01	1.17 E+01	3.04 E+02	1.21 E+01	2.54 E-01	-1.73 E+00	5.51 E-01	3.79 E-01	
	MIN	-6.99 E-02	5.33 E+00	1.15 E+01	5.10 E-01	-6.84 E-01	-1.02 E+01	-8.10 E+00	-8.60 E+01	
2-E25-24	MAX	2.44 E+00	1.50 E+02	1.24 E+03	5.40 E+01	1.12 E+00	6.19 E+00	5.93 E+00	5.38 E+01	NN
	AVE	1.39 E+00	2.25 E+01	5.22 E+02	1.59 E+01	3.30 E-01	-1.18 E+00	6.49 E-01	1.86 E+01	
	MIN	7.65 E-01	6.68 E+00	-1.72 E+01	3.84 E+00	-2.08 E-01	-1.17 E+01	-2.95 E+00	-4.78 E+01	

[a]Average.
[b]Below detection limit.
[c]Not applicable.
[d]Analyses not necessary (as determined from inventory, effluent history, or gross alpha/beta analyses).
[e]Maximum.
[f]Minimum.

The long-term concentration histories for wells 299-E16-2 and 299-E25-11 are shown in figures D-5 and D-6 of appendix D. Concentrations for 1985 are observed to fall within established trends.

3.2.4 216-A-36B Crib

Ammonia scrubber waste (ASD) discharged from PUREX is received by the 216-A-36B crib (see fig. 9), which is located just south of the PUREX Building. This disposal facility was active from 1966 to 1972, and was activated again in 1982. During 1985, 1.99 E+07 gal (7.54 E+07 L) of liquid waste were discharged to this crib.

Wells 299-E17-5 and 299-E17-9 monitor the 216-A-36B crib. Data for 1985 are presented in table 11A. The tritium concentration in well 299-E17-9 has increased slightly over 1984 (fig. 13). As noted in the discussion for the 216-A-10 crib, operation of PUREX is expected to increase tritium concentrations in ground water, but the impact at the site boundary is not expected to be significant. Results for other radionuclides are similar to those for 1984.

Isotopic uranium analyses were run on a sample from each monitoring well near the crib to supplement the total uranium analyses. Results are listed in table 11B with concentrations of ^{234}U, ^{235}U, and ^{238}U below the RHO-MA-139 guidelines of 3.2 E+01 pCi/L, 3.2 E+01 pCi/L, and 4.8 E+00 pCi/L, respectively.

The long-term concentration histories for the two monitoring wells at the 216-A-36B crib, shown on pages D-9 and D-10 of appendix D, indicate the results for 1985 are reasonable.

3.2.5 216-A-37-1 Crib

Process condensate from the 242-A evaporator (AFPC) is disposed to the 216-A-37-1 crib after diversion and monitoring in the concrete 207-A Retention Basin. The crib is located outside the 200 East Area, just east of the evaporator (see fig. 9). The waste stream has been active since 1977, and in 1985 a total of 1.30 E+07 gal (4.91 E+07 L) of effluent was disposed to the crib.

The crib is monitored by four wells, 299-E25-17 through 299-E25-20. The monitoring results for 1985 are contained in table 12. Concentrations of radionuclides are below RHO-MA-139 guidelines and are similar to 1984 results.

Figure 14 shows the history of tritium concentration in well 299-E25-17 for the past 6 yr and reflects the startup of PUREX in 1984. Long-term concentration histories for the effluent and ground water are shown on pages D-11 through D-14 in appendix D. Increases in tritium concentrations are apparent, but within the pattern of past operations.

Table 11A. Concentrations of Radiological Constituents and Nitrate for the Effluent and for Ground Water Near the 216-A-36B Crib in 1985.

		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (mg/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (μg/L)
Effluent										
PUREX (ASD)	AVE[a]	<4 E+02	6 E+05	3 E+06	NA[b]	3 E+04	1 E+04	NA	3 E+05	NN[c]
Wells										
	MAX[d]	1.20 E+01	6.60 E+01	2.71 E+06	1.16 E+02	5.14 E+00	7.67 E+00	7.89 E+00	4.79 E+01	2.26 E+01
2-E17-5	AVE	8.29 E+00	3.28 E+01	2.03 E+06	9.18 E+01	3.14 E+00	-4.65 E-01	2.11 E+00	-5.24 E+00	1.17 E+01
	MIN[e]	5.56 E+00	2.21 E+01	1.31 E+06	6.46 E+01	2.32 E+00	-1.41 E+01	-1.82 E+00	-8.01 E+01	6.53 E+00
	MAX	6.08 E+00	3.60 E+01	5.56 E+06	1.72 E+02	4.71 E+00	7.12 E+00	7.11 E+00	7.12 E+01	5.91 E+00
2-E17-9	AVE	3.54 E+00	2.71 E+01	4.68 E+06	1.40 E+02	4.17 E+00	-4.87 E-02	1.96 E+00	1.32 E+01	5.24 E+00
	MIN	2.15 E+00	2.20 E+01	3.82 E+06	1.08 E+02	3.30 E+00	-9.25 E+00	-7.09 E+00	-2.98 E+01	4.56 E+00

[a]Average.
[b]Not applicable.
[c]Analyses not necessary (as determined from inventory, effluent history, or gross alpha/beta analyses).
[d]Maximum.
[e]Minimum.

Table 11B. Isotopic Uranium Concentrations in Monitoring Wells Near the 216-A-36B Crib.

Well No.	Sample date	^{234}U (pCi/L)	^{235}U (pCi/L)	^{238}U (pCi/L)
299-E17-5	October 1985	4.65 E+00	1.69 E-01	4.38 E+00
299-E17-9	October 1985	2.41 E+00	7.40 E-02	2.20 E+00

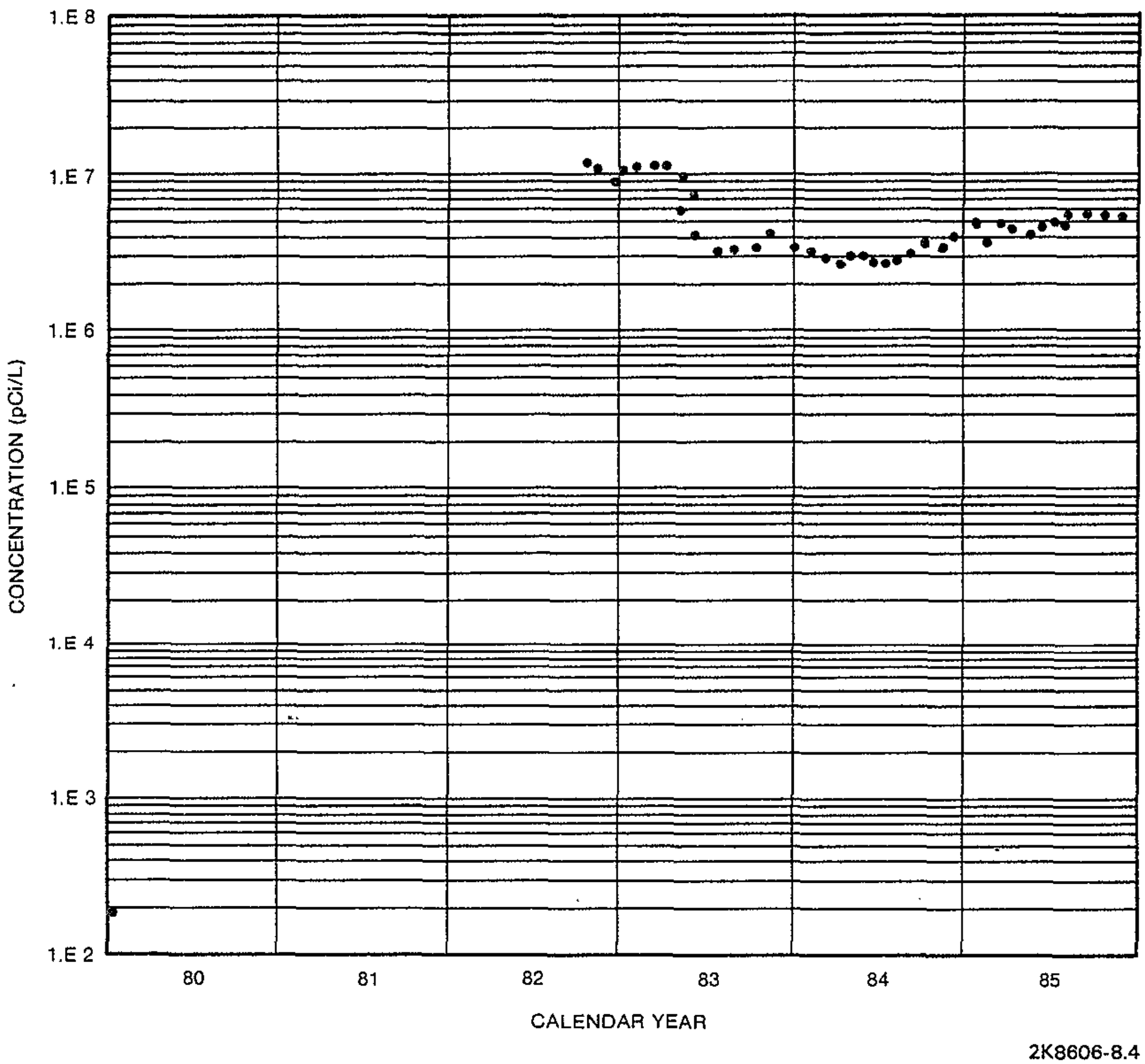

Figure 13. Tritium Concentration History in Well 299-E17-9 at the 216-A-36B Crib.

Table 12. Concentrations of Radiological Constituents and Nitrate for the Effluent and for Ground Water Near the 216-A-37-1 Crib in 1985.

		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (mg/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (μg/L)
					Effluent					
242-A (AFPC)	AVE[a]	BDL[b]	2 E+03	1 E+07	NA[c]	<3 E+02	5 E+02	NA	NN[d]	<3 E+01
					Wells					
2-E25-17	MAX[e]	2.10 E+00	1.12 E+01	1.69 E+05	1.98 E+01	7.71 E-01	3.44 E+00	8.27 E+00	5.98 E+01	
	AVE	1.31 E+00	6.79 E+00	1.29 E+05	1.37 E+01	3.19 E-01	-2.87 E-01	4.53 E+00	7.10 E+00	NN
	MIN[f]	9.75 E-01	4.01 E+00	8.41 E+04	4.21 E+00	-3.75 E-01	-8.54 E+00	2.26 E+00	-1.75 E+01	
2-E25-18	MAX	2.05 E+00	7.40 E+00	2.12 E+05	5.09 E+01	1.08 E+00	8.31 E+00	5.64 E+00	2.40 E+01	
	AVE	1.78 E+00	5.82 E+00	1.53 E+05	2.39 E+01	6.16 E-01	1.73 E+00	2.38 E+00	3.58 E+00	NN
	MIN	1.62 E+00	4.49 E+00	8.16 E+04	1.28 E+01	1.73 E-01	-1.42 E+00	-2.53 E+00	-1.45 E+01	
2-E25-19	MAX	2.47 E+00	1.61 E+01	9.88 E+05	2.01 E+02	7.50 E-01	4.87 E+00	5.91 E+00	5.21 E+01	
	AVE	1.06 E+00	9.96 E+00	6.01 E+05	1.10 E+02	4.42 E-01	1.12 E+00	-3.48 E+00	1.55 E+01	NN
	MIN	3.20 E-01	6.51 E+00	3.49 E+05	2.41 E+01	2.34 E-01	-3.56 E+00	-1.45 E+01	-3.81 E+01	
2-E25-20	MAX	4.36 E+00	1.55 E+01	1.37 E+06	2.80 E+02	3.41 E+00	3.10 E+00	3.39 E+00	7.96 E+00	
	AVE	1.87 E+00	1.34 E+01	8.02 E+05	1.98 E+02	9.19 E-01	1.10 E+00	-1.22 E+00	-2.23 E+01	NN
	MIN	5.23 E-01	3.96 E+00	3.25 E+05	1.14 E+02	-5.00 E-01	-1.42 E+00	-8.27 E+00	-3.88 E+01	

[a]Average.
[b]Below detection limit.
[c]Not applicable.
[d]Analyses not necessary (as determined from inventory, effluent history, or gross alpha/beta analyses).
[e]Maximum.
[f]Minimum.

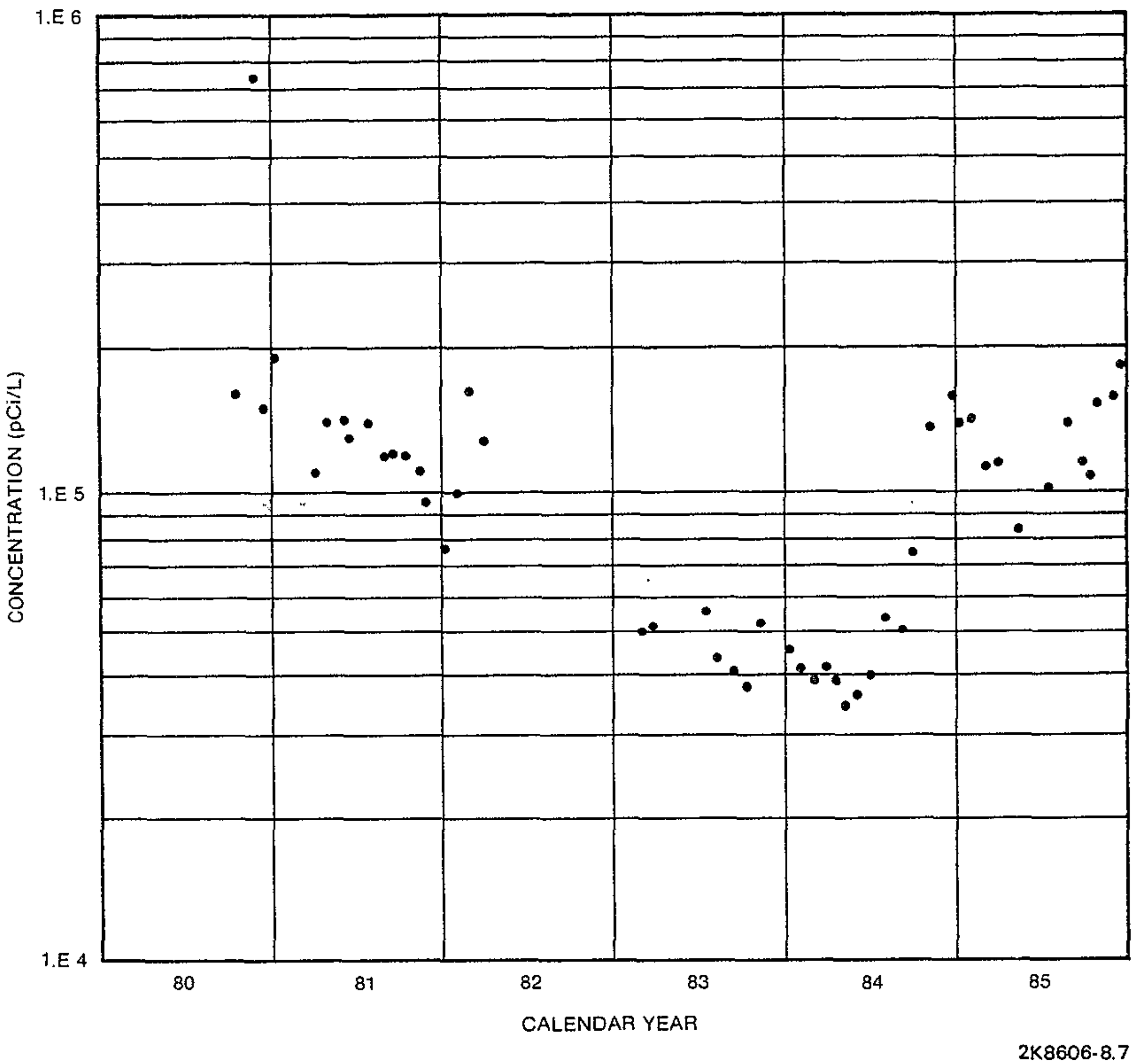

Figure 14. Tritium Concentration in Well 299-E25-17 at the 216-A-37-1 Crib.

3.2.6 216-B-55 Crib

The 216-B-55 crib is located west of B Plant in the northwestern part of 200 East Area (see fig. 9). Steam condensate waste (BCS) from B Plant has been disposed to the crib since 1967. The volume of effluent released in 1985 was 2.36 E+06 gal (8.94 E+06 L).

Wells 299-E28-12 and 299-E28-13 monitor this crib. Results of the monitoring for 1985 are listed in table 13. Concentrations of all radionuclides are observed to be below RHO-MA-139 guidelines. These results are typical for this crib as may be noted from the long-term concentration history graphs shown on pages D-15 and D-16 of appendix D.

3.2.7 216-B-62 Crib

Process condensate from B Plant (BCP) has been routed to the 216-B-62 crib, which is located northwest of B Plant (see fig. 9), since 1973. In 1985, the effluent volume was 1.03 E+06 gal (3.91 E+06 L).

Wells 299-E28-18 and 299-E28-21 provide monitoring capability for this crib. Table 14A summarizes the data obtained during 1985. Total alpha concentrations in wells at this crib are elevated in comparison with other 200 Area wells (appendix B.1). The total alpha is accounted for by uranium (Law et al. 1986). Isotopic uranium analyses (table 14B) supplement the uranium analyses summarized in table 14A. The concentrations of ^{234}U and ^{238}U exceed Rockwell guidelines (see table 4) at the crib, but because of dispersion and dilution (see section 1.3.4), can be expected to be below guidelines before reaching the Columbia River. The source of the uranium will be investigated in 1986.

Long-term concentration history graphs for this crib, shown on pages D-17 and D-18 of appendix D, indicate that 1985 concentrations are consistent with previous data.

3.2.8 216-S-26 Crib

The 216-S-26 crib receives steam condensate and sink waste from the 222-S Laboratory. The crib is located south of the 222-S Laboratory just outside the 200 West Area perimeter fence (fig. 10). Operation of the crib commenced in 1984 as a replacement for the 216-S-19 pond. During 1985, the crib received 1.18 E+07 gal (4.47 E+07 L) of effluent.

The crib is monitored by well 299-W27-1. Average concentrations of radionuclides in the ground water near the crib (table 15) are below Rockwell guidelines.

Table 13. Concentrations of Radiological Constituents and Nitrate for the Effluent and for Ground Water Near the 216-B-55 Crib in 1985.

		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (mg/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (µg/L)
Effluent										
B Plant (BCS)	AVE[a]	<1 E+01	2 E+03	NN[b]	NA[c]	<7 E+02	<3 E+02	NA	NN	NN
Wells										
2-E28-12	MAX[d]		2.68 E+01	1.37 E+05			2.85 E+00	5.90 E+00	3.46 E+01	
	AVE	NN	1.59 E+01	9.25 E+04	NN	NN	-9.26 E-01	-1.72 E+00	-2.32 E+01	NN
	MIN[e]		5.93 E+00	3.16 E+04			-2.85 E+00	-7.11 E+00	-1.04 E+02	
2-E28-13	MAX		1.08 E+01	8.62 E+03			5.57 E+00	9.67 E+00	5.60 E+01	
	AVE	NN	7.43 E+00	6.59 E+03	NN	NN	-1.08 E+00	5.32 E-01	-9.72 E-01	NN
	MIN		3.44 E+00	4.42 E+03			-5.85 E+00	-1.06 E+01	-1.34 E+02	

[a] Average.
[b] Analyses not necessary (as determined from inventory, effluent history, or gross alpha/beta analyses).
[c] Not applicable.
[d] Maximum.
[e] Minimun.

Table 14A. Concentrations of Radiological Constituents and Nitrate for the Effluent and for Ground Water Near the 216-B-62 Crib in 1985.

		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (mg/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (µg/L)
						Effluent				
B Plant (BCP)	AVE[a]	<2 E+02	2 E+06	NN[b]	NA[c]	4 E+05	7 E+04	NA	NN	<1 E+00
						Wells				
2-E28-18	MAX[d]	2.44 E+02	8.49 E+01	2.58 E+04	1.59 E+02	2.24 E+00	6.27 E+00	4.83 E+00	5.34 E+01	4.24 E+02
	AVE	1.42 E+02	6.27 E+01	1.57 E+04	1.17 E+02	7.47 E-01	2.81 E-01	-1.51 E+00	-1.31 E-01	2.59 E+02
	MIN[e]	4.70 E+01	3.33 E+01	8.60 E+03	7.88 E+01	-1.30 E-01	-1.06 E+01	-1.33 E+01	-7.83 E+01	1.80 E+02
2-E28-21	MAX	1.86 E+02	7.48 E+01	2.27 E+04	1.58 E+02	1.10 E+00	8.55 E+00	8.31 E+00	5.10 E+01	3.21 E+02
	AVE	1.44 E+02	4.62 E+01	1.51 E+04	8.75 E+01	4.19 E-01	-1.87 E+00	-3.23 E-01	5.59 E+00	1.88 E+02
	MIN	8.84 E+01	2.79 E+01	7.37 E+03	6.15 E+01	-2.72 E-01	-8.70 E+00	-1.07 E+01	-4.56 E+01	1.10 E+02

[a]Average.
[b]Analyses not necessary (as determined from inventory, effluent history, or gross alpha/beta analyses).
[c]Not applicable.
[d]Maximum.
[e]Minimum.

Table 14B. Isotopic Uranium Concentrations in Monitoring Wells Near the 216-B-62 Crib.

Well No.	Sample date	^{234}U (pCi/L)	^{235}U (pCi/L)	^{238}U (pCi/L)
299-E28-18	October 1985	9.61 E+01	5.77 E+00	9.98 E+01
299-E28-21	October 1985	6.63 E+01	2.68 E+00	6.61 E+01

Table 15. Concentrations of Radiological Constituents and Nitrate for the Effluent and for Ground Water Near the 216-S-26 Crib in 1985.

		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (mg/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (μg/L)
					Effluent					
222-S Laboratory		4 E+00	2 E+01	NN[a]	NA[b]	NN	NN	NA	NN	NN
					Well					
2-W27-1	MAX[c]	9.11 E+00	3.41 E+01	6.37 E+05	9.56 E+01	1.92 E+00	8.70 E+00	4.83 E+00	6.94 E+01	1.19 E+01
	AVE[d]	7.20 E+00	2.22 E+01	2.40 E+05	4.29 E+01	6.51 E-01	4.97 E+00	-9.30 E-01	3.61 E+01	9.42 E+00
	MIN[e]	5.01 E+00	1.54 E+01	9.80 E+04	2.33 E+01	-9.44 E-02	2.56 E+00	-9.13 E+00	1.35 E+01	5.58 E+00

[a]Analyses not necessary (as determined from inventory, effluent history, or gross alpha/beta analyses).
[b]Not applicable.
[c]Maximum.
[d]Average.
[e]Minimum.

3.2.9 216-U-12 Crib

The UO_3 Plant in 200 West Area supports the operation of PUREX. The process condensate effluent stream (U-12) from this plant is discharged to the 216-U-12 crib (see fig. 10). The volume of effluent in 1985 was 1.24 E+06 gal (4.68 E+06 L).

Well 299-W22-22 monitors this crib. Average concentrations of radionuclides in this well (table 16) are below RHO-MA-139 guidelines. These concentrations are similar to those reported in 1984.

Long-term concentration history for the monitoring well at this crib, shown on page D-19 in appendix D, provides a comparison with previous operation of the crib.

3.2.10 216-U-16 Crib

Steam condensate waste, chemical sewer waste, and cooling water from the 244-U and 271-U Plants were routed to the 216-U-16 crib instead of the 216-U-10 pond in July 1984. The crib is located southwest of the 224-U Plant in the south-central part of 200 West Area (see fig. 10). The volume of waste in the effluent stream totaled 3.25 E+07 gal (1.23 E+08 L) in 1985.

Wells 299-W19-13 and 299-W19-14 monitor the crib. Ground-water monitoring data for this crib are summarized in table 17. The concentration of uranium in well 299-W19-13 exceeded Rockwell guidelines. This was due to a contamination incident which primarily affected the inactive 216-U-1/2 cribs that are located about 300 ft (91 m) north of the 216-U-16 crib. This incident will be discussed in section 5.3. However because effluent going to the 216-U-16 crib served as the driving force, this crib was removed from service in February 1985. Effluent now is disposed to the 216-U-14 ditch, with a ground-water monitoring well planned for installation there in 1986.

3.2.11 216-W-LWC Crib

Liquid wastes from the laundry building are directed to the 216-W-LWC crib in 200 West Area (see fig. 10). This crib was placed into operation in 1981 and during 1985 received 1.91 E+07 gal (7.22 E+07 L) of effluent.

Well 299-W14-10 monitors this crib. Average concentrations of radionuclides and the effluent streams are listed in table 18. Concentrations were below RHO-MA-139 guidelines and similar to last year.

Table 16. Concentrations of Radiological Constituents and Nitrate for the Effluent and for Ground Water Near the 216-U-12 Crib in 1985.

		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (mg/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (μg/L)
Effluent										
UO_3 Plant (U-12)		<7 E+02	2 E+03	NN[a]	NA[b]	BDL[c]	BDL	NA	NN	2 E+03
Well										
2-W22-22	MAX[d]	1.97 E+00	6.33 E+00	2.94 E+03	3.37 E+01	3.21 E+00	9.75 E+00	6.77 E+00	8.03 E+01	9.91 E+00
	AVE[e]	1.07 E+00	4.04 E+00	2.11 E+03	6.95 E+00	3.92 E-01	1.92 E+00	8.63 E-01	-5.52 E+00	2.53 E+00
	MIN[f]	4.04 E-01	1.53 E+00	1.58 E+03	3.19 E-01	-8.50 E-01	-3.48 E+00	-6.66 E+00	-4.18 E+01	1.92 E-01

[a]Analyses not necessary (as determined from inventory, effluent history, or gross alpha/beta analyses).
[b]Not applicable.
[c]Below detection limit.
[d]Maximum.
[e]Average.
[f]Minimum.

Table 17. Concentrations of Radiological Constituents and Nitrate for the Effluent and for Ground Water Near the 216-U-16 Crib in 1985.

		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (mg/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (μg/L)
					Effluent					
UO_3 Plant	AVE[a]	<2 E+02	<1 E+01	NN[b]	NA[c]	BDL[d]	<1 E+01	NA	NN	<4 E+01
					Wells					
	MAX[e]	2.19 E+01	2.58 E+01	2.05 E+02	2.79 E+02	6.49 E-01	7.83 E+00	9.44 E+00	4.66 E+01	3.69 E+01
2-W19-13	AVE	1.86 E+01	1.24 E+01	8.85 E+01	8.35 E+01	1.65 E-01	2.06 E+00	1.14 E+00	1.70 E+00	2.58 E+01
	MIN[f]	1.07 E+01	3.81 E+00	-1.34 E+02	1.58 E+01	-2.39 E-01	-4.13 E+00	-5.32 E+00	-8.94 E+01	1.74 E+01
	MAX	5.60 E+00	1.89 E+01	3.92 E+02	1.18 E+02	1.60 E+00	9.75 E+00	6.06 E+00	7.96 E+01	8.55 E+00
2-W19-14	AVE	4.07 E+00	8.94 E+00	6.92 E+01	2.40 E+01	5.34 E-01	6.39 E-01	-2.09 E+00	-2.05 E+00	5.26 E+00
	MIN	2.13 E+00	3.63 E+00	-1.36 E+02	1.40 E+00	-5.03 E-03	-6.61 E+00	-1.57 E+01	-6.61 E+01	2.32 E+00

[a]Average.
[b]Analyses not necessary (as determined from inventory, effluent history, or gross alpha/beta analyses).
[c]Not applicable.
[d]Below detection limit.
[e]Maximum.
[f]Minimum.

9 2 1 2 1 5 6 2 0 0 3

Table 18. Concentrations of Radiological Constituents and Nitrate for the Effluent and for Ground Water Near the 216-W-LWC Crib in 1985.

		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (mg/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (μg/L)
					Effluent					
Laundry (LWC)	AVE[a]	<6 E+01	1 E+03	NN[b]	NA[c]	2 E+02	2 E+02	NA	NN	NN
					Well					
2-W14-10	MAX[d]	5.58 E+00	1.83 E+01	3.91 E+02	9.83 E+01	6.52 E-01	7.67 E+00	5.66 E+00	4.76 E+01	
	AVE	3.69 E+00	7.88 E+00	2.13 E+02	7.21 E+01	2.94 E-01	2.81 E+00	2.33 E+00	3.06 E+00	NN
	MIN[e]	1.38 E+00	4.62 E+00	-5.17 E+01	4.52 E+01	-1.90 E-01	-5.34 E+00	-2.53 E+00	-4.09 E+01	

[a]Average.
[b]Analyses not necessary (as determined from inventory, effluent history, or gross alpha/beta analyses).
[c]Not applicable.
[d]Maximum.
[e]Minimum.

3.2.12 <u>216-Z-20 Crib</u>

The 216-Z-20 crib receives effluent (2904-ZA and 231-Z waste streams) from the 231-Z and 234-5Z buildings. The crib is located south of the 234-5Z Building in 200 West Area (see fig. 10), and became operational in 1981. The discharge to the crib was 1.21 E+08 gal (4.57 E+08 L) during 1985.

The 216-Z-20 crib has four ground-water monitoring wells along the length of the crib, identified as 299-W18-17 through 299-W18-20. Results of the analyses for 1985 (table 19) are all below RHO-MA-139 guidelines and similar to the low values for 1984.

Table 19. Concentrations of Radiological Constituents and Nitrate for the Effluent and for Ground Water Near the 216-Z-20 Crib in 1985.

		Alpha (pCi/l)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (mg/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (μg/L)
					Effluent					
234-5 Z (2904-AZ) 231-Z (231-Z)	AVE[a]	1 E+03	2 E+02	NN[b]	NA[c]	NN	NN	NA	NN	NN
					Wells					
	MAX[d]	8.12 E-01	4.51 E+00	3.15 E+02	2.84 E+00		2.75 E+00	6.79 E+00	7.65 E+01	
2-W18-17	AVE	2.79 E-01	3.86 E+00	2.90 E+02	2.68 E+00	NN	-6.92 E-01	-1.83 E+00	2.56 E+01	NN
	MIN[e]	-5.08 E-02	2.93 E+00	2.66 E+02	2.54 E+00		-4.47 E+00	-1.06 E+01	-5.81 E+00	
	MAX	6.97 E-01	4.94 E+00	9.42 E+02	4.32 E+00		5.70 E+00	7.10 E+00	4.62 E+01	
2-W18-18	AVE	3.56 E-01	2.84 E+00	1.49 E+02	1.67 E+00	NN	2.34 E+00	-2.01 E+00	6.28 E+00	NN
	MIN	1.37 E-01	2.01 E+00	-2.07 E+02	3.19 E-01		-2.56 E+00	-1.48 E+01	-3.83 E+01	
	MAX	1.08 E+00	5.80 E+00	4.80 E+03	5.67 E+01		4.63 E+00	5.91 E+00	4.15 E+01	
2-W18-19	MIN	5.57 E-01	4.11 E+00	4.64 E+02	1.40 E+01	NN	-1.44 E+00	-5.86 E-01	-4.85 E+00	NN
	MIN	4.90 E-02	6.32 E-02	-2.54 E+02	1.46 E+00		-8.26 E+00	-9.49 E+00	-7.16 E+01	
	MAX	5.97 E-01	7.27 E+00	5.13 E+01	2.93 E+00		3.44 E-01	4.84 E+00	6.99 E+01	
2-W18-20	AVE	3.73 E-01	4.87 E+00	4.08 E+01	1.77 E+00	NN	-3.33 E+00	1.42 E+00	7.59 E+00	NN
	MIN	2.50 E-01	2.44 E+00	3.02 E+01	8.01 E-01		-8.95 E+00	-5.09 E+00	-5.59 E+01	

[a]Average.
[b]Analyses not necessary (as determined from inventory, effluent history, or gross alpha/beta analyses).
[c]Not applicable.
[d]Maximum.
[e]Minimum.

4.0 SEPARATIONS AREA WATER-USE BALANCE

Water for processing, sanitary use, and power generation is obtained from the Columbia River and pumped to treatment and storage facilities in the 200 East and 200 West Areas. Summaries of water use for each area are provided in tables 20 and 21. These tables also indicate the disposal facility for each waste stream. Sanitary water is disposed to ground via septic tank drainage systems near the plant buildings. Water-use data were obtained from facility processing records and estimates and from powerhouse records.

Table 20. Water-Use Balance for 200 East Area During CY 1985.

Water use	Disposal facility No.	Volume (gal)	Volume (L)
202-A Process Condensate[a] (PDD)	216-A-10	2.69 E+07	1.02 E+08
202-A Steam Condensate[a] (SCD)	216-A-30 216-A-37-2	1.71 E+08 6.26 E+07	6.46 E+08 2.37 E+08
202-A Ammonia Scrubber Waste[a] (ASD)	216-A-36B	1.99 E+07	7.54 E+07
242-A Process Condensate[a] (AFPC)	216-A-37-1	1.30 E+07	4.91 E+07
241-AY, AZ Tank Farm Coil Condensate[a] (A08)	216-A-8	6.10 E+04	2.31 E+05
PUREX Chemical Sewer[a] (CSL)	216-B-3	4.62 E+08	1.75 E+09
PUREX Cooling Water[a] (CWL) 242-A Cooling Water[a] (ACW) 242-A Steam Condensate[a] (ASC) 244-AR Vault Cooling Water[a] (CAR) 241-A Tank Farm Cooling Water[a] (CA8) B Plant Cooling Water[a] (CBC) Powerhouse Water[a] (A25 SUM)	216-B-3 216-A-25	5.97 E+09	2.26 E+10
B Plant Chemical Sewer[a] (BCE)	216-B-63	8.19 E+07	3.10 E+08
B Plant Steam Condensate[a] (BCS)	216-B-55	2.36 E+06	8.94 E+06
B Plant Process Condensate[a] (BCP)	216-B-62	1.03 E+06	3.91 E+06
Water Treatment Facility	216-A-25 216-B-3	9.11 E+07	3.45 E+08
Powerhouse Ash Sluice Baghouse Cleaning Sanitary Water	Ash Pit Misc. Tile Fields	8.10 E+06 2.40 E+07	3.07 E+07 9.10 E+07
U.S. Ecology		4.55 E+05	1.72 E+06
Total Water Use in 200 East Area in 1985		6.93 E+09	2.62 E+10

[a]Volumes from Aldrich (1986).

Table 21. Water-Use Balance for 200 West Area During CY 1985.

Water use	Disposal facility No.	Volume (gal)	Volume (L)
Redox Chemical Sewer[a] (S-10)	216-S-11	5.34 E+07	2.02 E+08
222-S Laboratory Pond[a] (207-SL)	216-S-26	1.18 E+07	4.47 E+07
242-S Process Condensate[a] (RC3) (Ion Exchange Column)	216-S-25	8.35 E+06	3.16 E+07
UO_3 Plant Process Condensate[a] (U-12)	216-U-12	1.24 E+06	4.68 E+06
242-S Steam Condensate[a] (RC1)	216-U-14	4.70 E+06	1.78 E+07
UO_3 Plant Steam Condensate and Cooling Water (207-U)	216-U-14 216-U-16	1.07 E+08 3.25 E+07	4.04 E+08 1.23 E+08
231-Z Cooling Water[a] (231-Z) 234-5Z Liquid Waste[a] (2904-ZA)	216-Z-20	1.21 E+08	4.57 E+08
Laundry[a] (LWC)	216-W-LWC	1.91 E+07	7.23 E+07
Powerhouse and Water Treatment Facility	216-U-10 Powerhouse Pond	7.53 E+07	2.85 E+08
Powerhouse Ash Sluice Baghouse Cleaning	Ash Pit	8.10 E+06	3.07 E+07
Sanitary Water	Misc. Tile Fields	2.47 E+07	9.36 E+07
T Plant Drain Flush and Head-End Wastes	216-T-1	8.98 E+06	3.40 E+07
221-T Cold Chemical Drain and Compressor	216-T-4-2	2.20 E+07	7.33 E+07
Total Water Use in 200 West Area in 1985		4.98 E+08	1.89 E+09

[a]Volumes from Aldrich (1986).

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5.0 INACTIVE DISPOSAL SITES

Liquid waste disposal sites which no longer receive wastes are monitored for changes that would indicate a potential problem. While there are no concentration guidelines for inactive sites, concentrations of ground-water samples are compared with RHO-MA-139 guidelines for reference purposes. Historically, samples from two disposal sites, the 216-B-5 reverse well and the 216-S-1 and S-2 crib, yield concentrations greater than the Rockwell guidelines. Two other inactive sites containing elevated concentrations of uranium, the 216-U-1/2 cribs and the 216-U-10 pond, are discussed in this section. The 216-U-10 Pond was deactivated in late 1984 after being the major source of ground-water recharge in the 200 West Area, but the ground-water mound remains. Monitoring results for wells near other inactive liquid disposal sites are reported in appendix B.1.

5.1 INACTIVE 216-B-5 REVERSE WELL

A reverse well at the Hanford Site is a well that received liquid waste for disposal to ground. The 216-B-5 well discharged waste to the water table from 1945 to 1947. This reverse well is located northeast of the 221-B Building in 200 East Area (see fig. 9), and received waste from this building.

A characterization study (Smith 1980) determined the concentration and distribution of radionuclides in the sediments surrounding the well. This study, in addition to gamma logs in various wells, indicates that the contamination has remained with 40 ft (12 m) of the well. No significant changes were observed in the results of ground-water monitoring of well 299-E28-23 in 1985. Quarterly monitoring yielded an average ^{90}Sr concentration of 6.95 E+03 pCi/L versus 1.21 E+04 pCi/L in 1984 (Law et al. 1986), and a ^{137}Cs average concentration of 3.57 E+03 pCi/L versus 3.86 E+03 pCi/L in 1984. Both of these radionuclides exceed their respective RHO-MA-139 guidelines, which are 3.0 E+01 pCi/L for ^{90}Sr and 2 E+03 pCi/L for ^{137}Cs (see table 4).

5.2 INACTIVE 216-S-1/2 CRIBS

The 216-S-1/2 cribs received waste from the 202-S Building from 1952 to 1956. Elevated ^{90}Sr concentrations have been observed since that period. A study (Van Luik and Smith 1982) of the concentration and distribution of contaminants indicated that the contaminants were held on sediments near the bottom of the crib. This investigation also concluded that the contamination was due to a break in a well casing within the crib. Strontium-90 has been decreasing with time and the concentrations from quarterly sampling of well 299-W22-1 averaged 1.42 E+02 pCi/L in 1985 versus the 1983 average of 2.73 E+02 pCi/L. The RHO-MA-139 guideline is 3.0 E+01 pCi/L. The ^{90}Sr concentrations were two orders of magnitude higher during the 1970s.

5.3 INACTIVE 216-U-1/2 CRIBS

The 216-U-1/2 cribs are located southwest of the 221-U Building in the south-central part of the 200 West Area (see fig. 10 and 15). The cribs received waste from the 221-U and 224-U Buildings from 1952 to 1967.

Wells 299-W19-3 and 299-W19-11 (see fig. 15) are routinely monitored at the 216-U-1/2 crib site, where the water table is approximately 220 ft (67 m) below ground surface. Results of the routine monitoring of these wells in 1985 are summarized in table 22. All radioactive constituents are within Rockwell guidelines with the exception of uranium, which resulted from a contamination incident.

Upon discovery in February 1985 that the uranium concentration in the ground water beneath the crib had abruptly increased to 7.2 E+05 pCi/L, Rockwell immediately launched an investigation and ceased disposal to the nearby 216-U-16 crib (see fig. 15), which had recently been put into operation. The investigation included continuous pumping and sampling of the monitoring wells and the construction of two new wells: 299-W19-15 and 299-W19-16 (see fig. 15). Geophysical well-logging procedures and analysis of archived sediment samples were also performed.

Additional action included grout sealing of well 299-W19-3, which had been scheduled for remedial grout work, and well 299-W19-11, which was grouted to 150 ft (46 m) when constructed, was regrouted to a depth of 200 ft (61 m). Well 299-W19-9 a reverse well constructed in the 1940s but never used, was also grouted.

The likely mechanism of contamination was deduced to be effluent from the 216-U-16 crib activated in July 1985 percolating downward and perching on a low-conductivity caliche layer at a depth of about 165 ft (50 m). The perched water moved laterally, extending to beneath the 216-U-1/2 cribs, and provided a force for mobilizing uranium deposited on the sediments when the crib was operational. This conceptualization is depicted in figure 16. The crib received low- and intermediate-level radioactive waste containing 4,000 kg of uranium between 1952 and 1967. Much of the uranium was sorbed on the sediments beneath the crib. Late in their service, the cribs received acidic waste used in decontamination operations, which partially dissolved the uranium held on the sediments. However, the low volume of decontamination waste did not provide a sufficient driving force for significant transport of uranium to the water table until the perched water from the 216-U-16 crib mobilized this previously released uranium, allowing it to migrate downward along the outside of well casings or through discontinuities or weak spots in the caliche layer.

Rockwell elected to perform remedial action at the 216-U-1/2 crib site, even though modeling by PNL predicted that DOE guidelines would not be violated when the plume reached the site boundary, i.e., the Columbia River. Pumping commenced on June 13, 1985, and continued until November 26, 1985, when it was necessary to shut down because of freezing weather. Eight million gallons (1.14 E+07 L) of ground water were pumped from well 299-W19-11 resulting in the removal of 687 kg of uranium via an ion exchange

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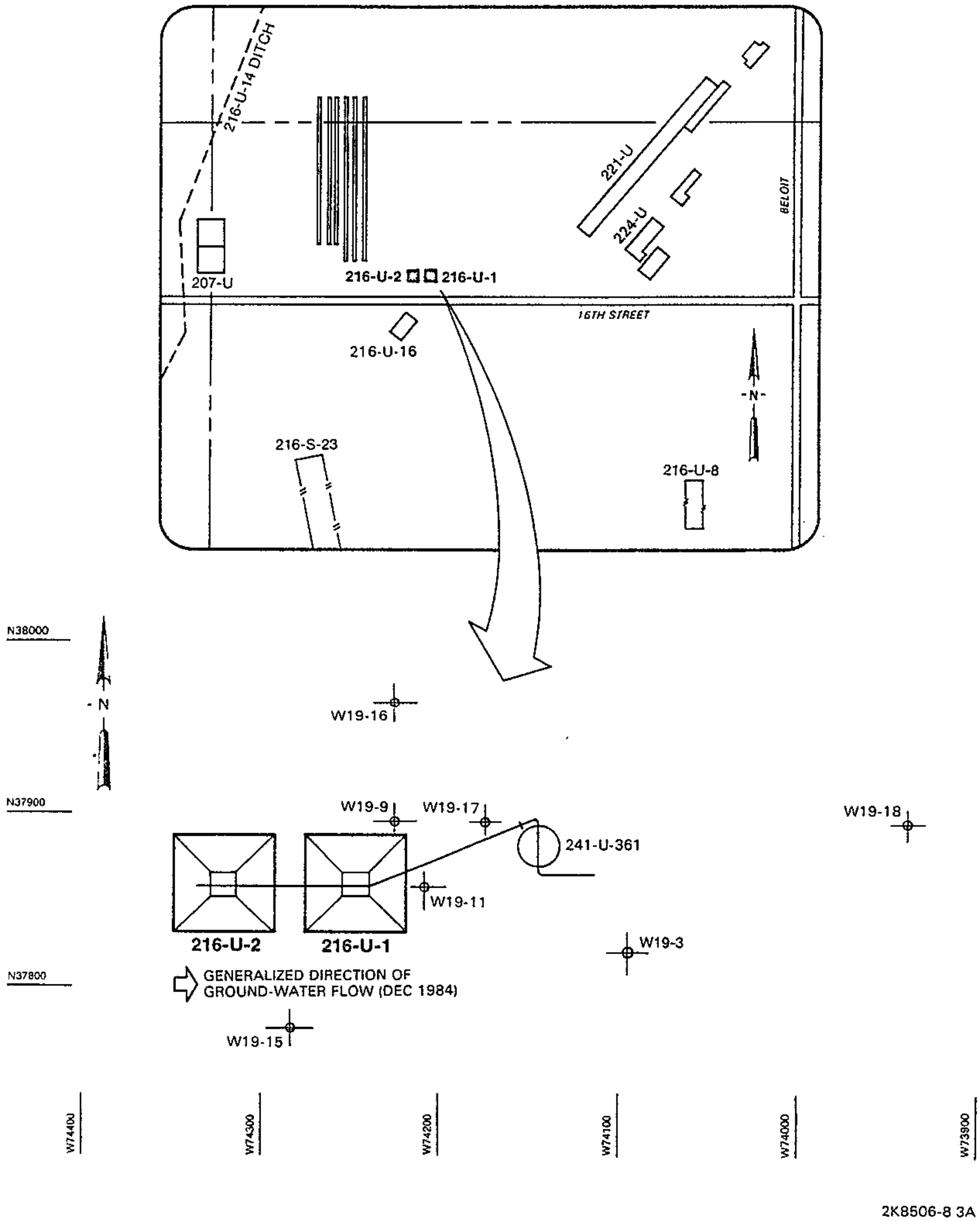

Figure 15. Location of the Inactive 216-U-1/2 Cribs and Placement of Monitoring Wells.

9 2 1 2 4 6 6 2 0 1 3

Table 22. Concentrations of Radiological Constituents and Nitrate for Ground Water Near the 216-U-1/2 Cribs in 1985.

Well No.		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (mg/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (μg/L)
2-W19-3	MAX[a]	1.09 E+04	6.48 E+03	6.04 E+03	1.55 E+03	2.00 E+00	6.20 E+00	1.64 E+01	1.48 E+01	1.45 E+04
	AVE[b]	7.75 E+03	3.55 E+03	4.37 E+03	7.15 E+02	2.00 E+00	-1.86 E+00	1.21 E+01	-3.14 E+01	1.26 E+04
	MIN[c]	5.69 E+03	1.58 E+03	1.53 E+03	8.19 E+01	2.00 E+00	-7.31 E+00	5.66 E+00	-9.19 E+01	1.08 E+04
2-W19-11	MAX	4.87 E+04	8.63 E+04	3.00 E+04	1.51 E+03	2.14 E+00	0.00 E+00	2.97 E+01	2.99 E+01	1.20 E+05
	AVE	2.72 E+04	8.63 E+04	1.42 E+04	6.60 E+02	2.14 E+00	-3.68 E+00	1.18 E+01	7.03 E+00	1.20 E+05
	MIN	3.82 E+00	8.63 E+04	8.87 E+02	7.13 E+01	2.14 E+00	-9.27 E+00	1.77 E+00	-1.49 E+01	1.20 E+05

[a]Maximum.
[b]Average.
[c]Minimum.

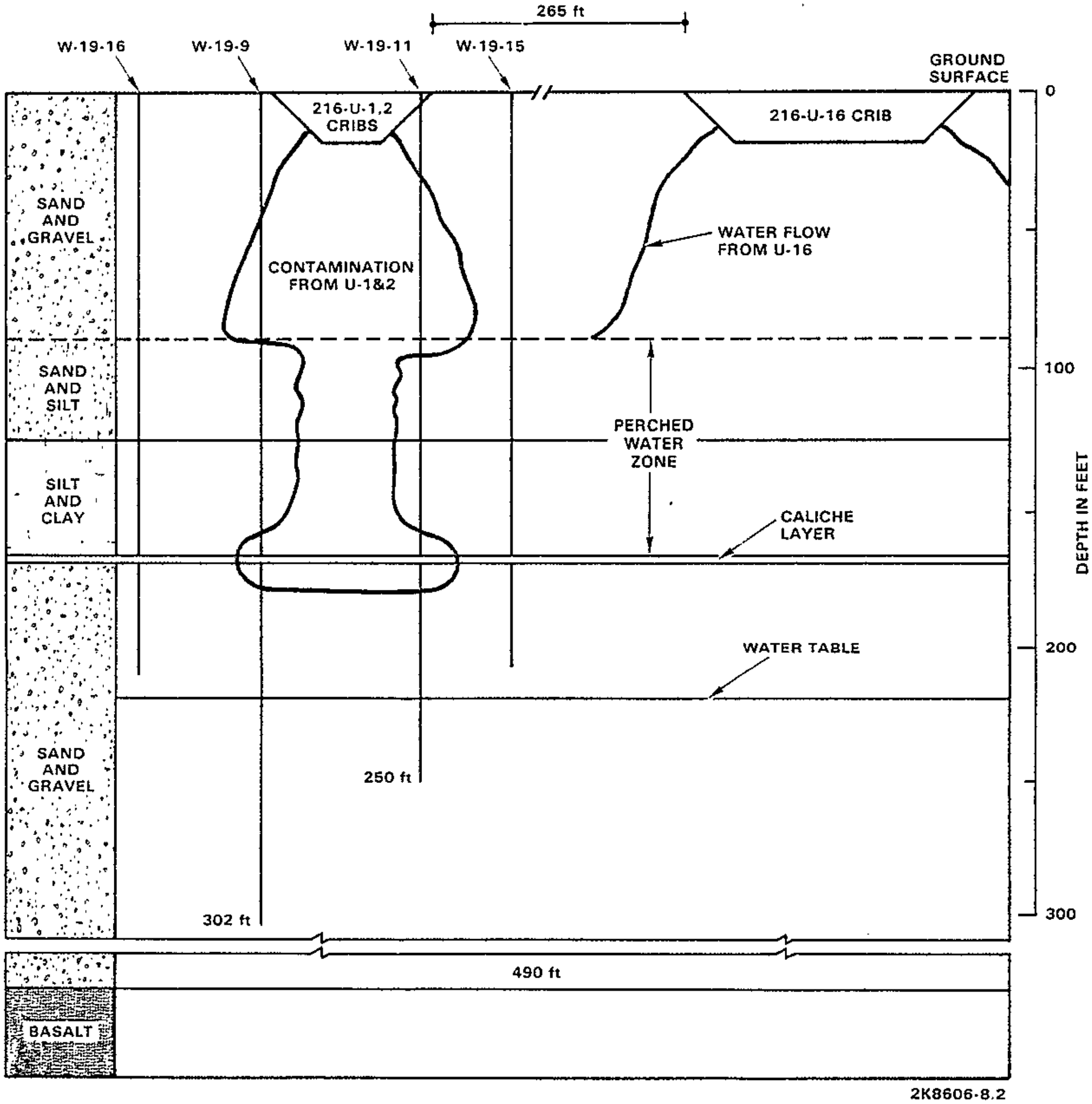

Figure 16. Mechanism of Contamination at 216-U-1/2 Cribs.

9 2 1 2 4 5 5 2 0 1 4

column at the 242-S evaporator. Maximum uranium concentration was reduced from about 68,000 pCi/L before pumping to about 17,000 pCi/L afterward (fig. 17). Two additional monitoring wells, 299-W19-17 and 299-W19-18 (see fig. 15), were constructed to provide additional information on ground-water conditions. Results of special monitoring are included in appendix E and illustrate that the remedial action has successfully reduced concentrations of uranium.

Rockwell is now evaluating the actions taken, and the concentrations of uranium in the ground water, to determine if additional remedial action is appropriate.

Effluent from the ion exchange column at the 242-S evaporator, which operated at an efficiency of 94%, was discharged to the 216-S-25 crib. Uranium concentrations in well 299-W23-10 (table E-7, appendix E) exceed RHO-MA-139 guidelines of 9.84 pCi/L. Review of available information indicates that this contamination probably represents background concentrations from operation of U Pond. Uranium recovered from the ion exchange column was sent to a double-wall tank in the 241-SY Tank Farm for storage. Results of routine monitoring of this crib are listed in table 23, and results of the special monitoring are included in appendix E.

5.4 INACTIVE 216-U-10 (U Pond)

The 216-U-10 Pond was deactivated in December 1984, after 40 yr of operation. The pond, located in the southwest corner of 200 West Area (see fig. 10), was removed from service as a water conservation measure and to remove the driving force acting on the contaminated sediments of the pond bottom.

Table 24A summarizes the 1985 ground-water monitoring results for the three monitoring wells: 299-W18-15, 299-W23-11, and 699-35-78A. Average concentrations of radionuclide constituents are within Rockwell guidelines with the exception of uranium. Elevated uranium concentrations were reported for 1984 (Law et al. 1986) and similar results are observed in 1985. Isotopic uranium results for the three wells are listed in table 24B.

Uranium concentrations observed in well 299-W-10 ranged between 12.2 pCi/L and 24.9 pCi/L (see table E-7 in appendix E) and exceeded the Rockwell guidelines of 9.84 pCi/L. However, these concentrations represent an overall improvement in the ground water when compared to concentrations beneath the 216-U-1/2 cribs.

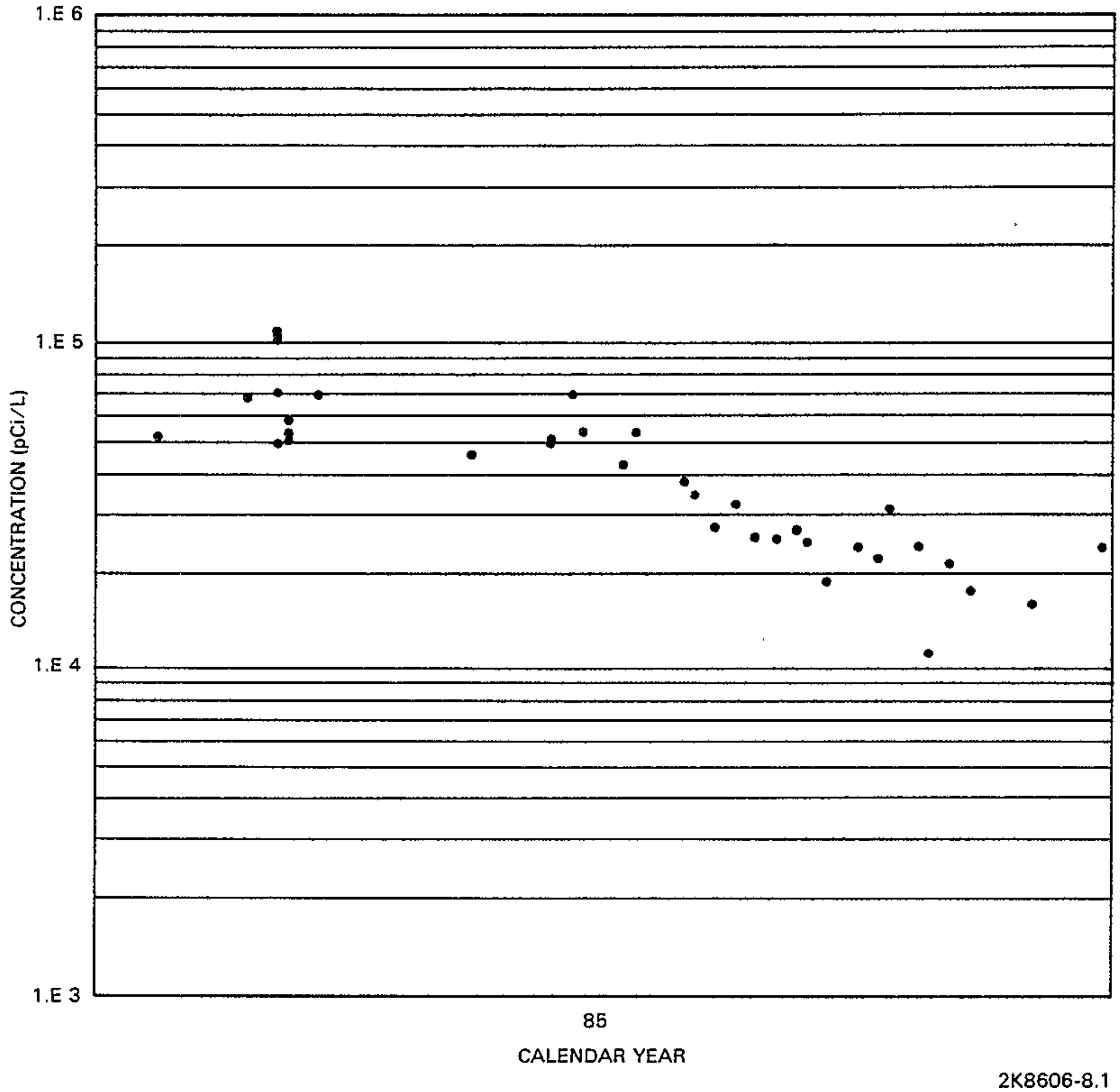

Figure 17. Uranium Concentration History in Well 299-W19-11 at the 216-U-1/2 Cribs.

Table 23. Concentrations of Radiological Constituents and Nitrate for the Effluent and for Ground Water Near the 216-S-25 Crib in 1985.

		Total alpha (pCi/mL)	Total beta (pCi/mL)	Tritium (pCi/mL)	Nitrate (mg/L)	^{90}Sr (pCi/mL)	^{137}Cs (pCi/mL)	^{60}Co (pCi/mL)	^{106}Ru (pCi/mL)	Uranium (pCi/mL)
					Effluent					
234-5 Z (2904-AZ) 231-Z (231-Z)	AVE[a]	2.00 E+00	2.00 E-01	NA[b]	7.40	<3.00 E-02	BDL[c]	NA	BDL	NA
					Well					
2W 18 17	MAX[d]	3.18 E-03	3.02 E-02	9.44 E-01			6.41 E-03	7.36 E-03	2.53 E-02	
	AVE	7.95 E-04	1.70 E-02	4.65 E-01	9.98 E-01[g]	NN[h]	1.60 E-03	3.02 E-03	6.32 E-03	NN
	MIN[e]	0.00 E-01[f]	4.84 E-03	1.55 E-01			0.00 E-01[f]	0.00 E-01[f]	0.00 E-01[f]	
2W 18 18	MAX	6.15 E-03	9.29 E-02	3.57 E-01			3.44 E-03	6.75 E-03	1.61 E-02	
	AVE	3.38 E-03	2.74 E-02	2.03 E-01	1.06 E+00[g]	NN	1.15 E-03	1.94 E-03	6.38 E-03	NN
	MIN	1.16 E-03	0.00 E-01[f]	0.00 E-01[f]			0.00 E-01[f]	0.00 E-01[f]	0.00 E-01[f]	
2W 18 19	MAX	1.18 E-02	2.83 E-02	8.10 E+00	2.58 E+01		6.41 E-03	7.36 E-03	4.38 E-02	
	AVE	2.66 E-03	1.18 E-02	2.36 E+00	7.36 E+00	NN	2.11 E-03	1.20 E-03	1.30 E-02	NN
	MIN	0.00 E-01[f]	0.00 E-01[f]	0.00 E-01[f]	1.15 E-01		0.00 E-01[f]	0.00 E-01[f]	0.00 E-01[f]	
2W 18 20	MAX	1.13 E-02	2.94 E-02	2.16 E+00	5.93 E+00		6.82 E-03	6.11 E-03	4.74 E-02	
	AVE	3.59 E-03	9.73 E-03	3.91 E-01	1.45 E+00	NN	2.16 E-03	1.86 E-03	1.73 E-02	NN
	MIN	0.00 E-01[f]	0.00 E-01[f]	6.50 E-03	6.60 E-02		0.00 E-01[f]	0.00 E-01[f]	0.00 E-01[f]	

[a]Average.
[b]NA--no analysis for this constituent.
[c]BDL--below detection limit.
[d]Maximum.
[e]Minimum.
[f]Negative analytical values appear as zeroes.
[g]Three values or less, no maximum or minimum calculated.
[h]Analyses not necessary (as determined from inventory, effluent history, or gross alpha/beta analyses).

Table 24A. Concentrations of Radiological Constituents and Nitrate for the Effluent and for Ground Water Near the 216-U-10 Pond in 1985:

Well No.		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (mg/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (μg/L)
	MAX[a]	5.52 E+01	1.97 E+01	5.84 E+02	2.76 E+01		3.84 E+00	6.07 E+00	6.83 E+01	6.84 E+01
2-W18-15	AVE[b]	4.13 E+01	1.54 E+01	1.39 E+02	3.38 E+00	NN[d]	-1.11 E+00	-1.07 E+00	-1.67 E+01	5.72 E+01
	MIN[c]	2.75 E+01	1.31 E+01	-2.23 E+01	3.50 E-01		-6.76 E+00	-8.10 E+00	-1.78 E+02	4.74 E+01
	MAX	2.02 E+01	1.59 E+02	5.53 E+05			3.44 E+00	7.09 E+00	2.43 E+01	2.64 E+01
2-W23-11	AVE	1.54 E+01	2.64 E+01	6.31 E+04	NN	NN	1.42 E-03	-7.56 E+01	-1.78 E+01	1.98 E+01
	MIN	9.41 E+00	3.53 E+00	-1.51 E+02			-4.47 E+00	-7.12 E+00	-7.48 E+01	7.83 E+00
	MAX	1.06 E+01	8.29 E+00	8.75 E+02	1.34 E+00		6.54 E+00	4.86 E+00	5.83 E+01	1.55 E+01
6-35-78A	AVE	6.84 E+00	4.69 E+00	1.65 E+02	9.28 E-01	NN	9.05 E+01	8.52 E-01	6.60 E+00	1.06 E+01
	MIN	1.32 E+00	2.55 E+00	-1.99 E+02	4.00 E-01		-5.43 E+00	-6.65 E+00	-5.36 E+01	4.56 E+00

[a]Maximum.
[b]Average.
[c]Minimum.
[d]Analyses not necessary (as determined from inventory, effluent history, or gross alpha/beta analyses).

Table 24B. Isotopic Uranium Concentrations in Monitoring Wells Near the 216-U-Pond.

Well No.	Sample date	^{234}U (pCi/L)	^{235}U (pCi/L)	^{238}U (pCi/L)
299-W18-15	October 1985	1.52 E+01	5.94 E-01	1.58 E+01
299-W23-11	October 1985	6.47 E+00	3.37 E-01	5.94 E+00
699-35-78A	October 1985	4.56 E+00	2.87 E-01	4.65 E+00

6.0 CONCENTRATION PLUME MAPS

Isopleth maps have been prepared to illustrate the spatial distribution of the average concentration of several ground-water constituents in relation to processing facilities in the Separations Area. Two sets of maps have been prepared: one focuses on the Separations Area, the other addresses the region that is influenced by waste disposal operations, termed the affected area. Rockwell tritium data has been supplemented with PNL data in the 600 Area for the construction of the maps.

Plume maps have been prepared for average concentrations of tritium and nitrate, since the high mobilities associated with these constituents will indicate the maximum extent of contaminant migration. A map of the extent of total beta contamination has been prepared for the Separations Area only. The total beta concentration has decayed downgradient from the Separations Area, thus an affected area map was not appropriate.

6.1 TOTAL BETA

The total beta map for the Separations Area (fig. 18) shows the 100, 1,000, and 10,000 pCi/L isopleths. Total beta is restricted to a few locations within the 200 East and 200 West Areas. In the 200 East Area, total beta is greater than 1,000 pCi/L near the 241-BX Tank Farm and the 216-BY cribs, and greater than 10,000 pCi/L at the 216-B-5 reverse well site. In the 200 West Area, total beta concentrations greater than 100 pCi/L, but less than 1,000 pCi/L are located around the 216-S, 216-T, and 216-Z-20 cribs. Of these cribs, only the 216-Z-20 crib in 200 West Area is active. The total beta concentration exceeding 10,000 pCi/L is at the 216-U-1/2 cribs in 200 West Area and is associated with the uranium concentration there (see section 5.3).

6.2 TRITIUM

Maps depicting tritium concentrations of the Separations Area and the affected area are shown in figures 19 and 20, respectively. Tritium isopleths for 20,000; 200,000; and 2,000,000 pCi/L are shown in these figures.

The tritium plume map for the Separations Area (see fig. 19) shows tritium emanating from six sources: the inactive 216-S and 216-T cribs and the active 216-U-12 crib in 200 West Area; and the active 216-A, 216-B-55, and 216-B-62 cribs in 200 East Area.

In 200 West Area, the plume from the 216-S crib area is moving eastward and the plume from the 216-T Crib area is moving north, both of which are caused by radial flow from the ground-water mound beneath the deactivated U Pond (see fig. 2). Elevated tritium concentrations in the southeast corner of 200 East Area, around the 216-A crib area south of PUREX, reflect

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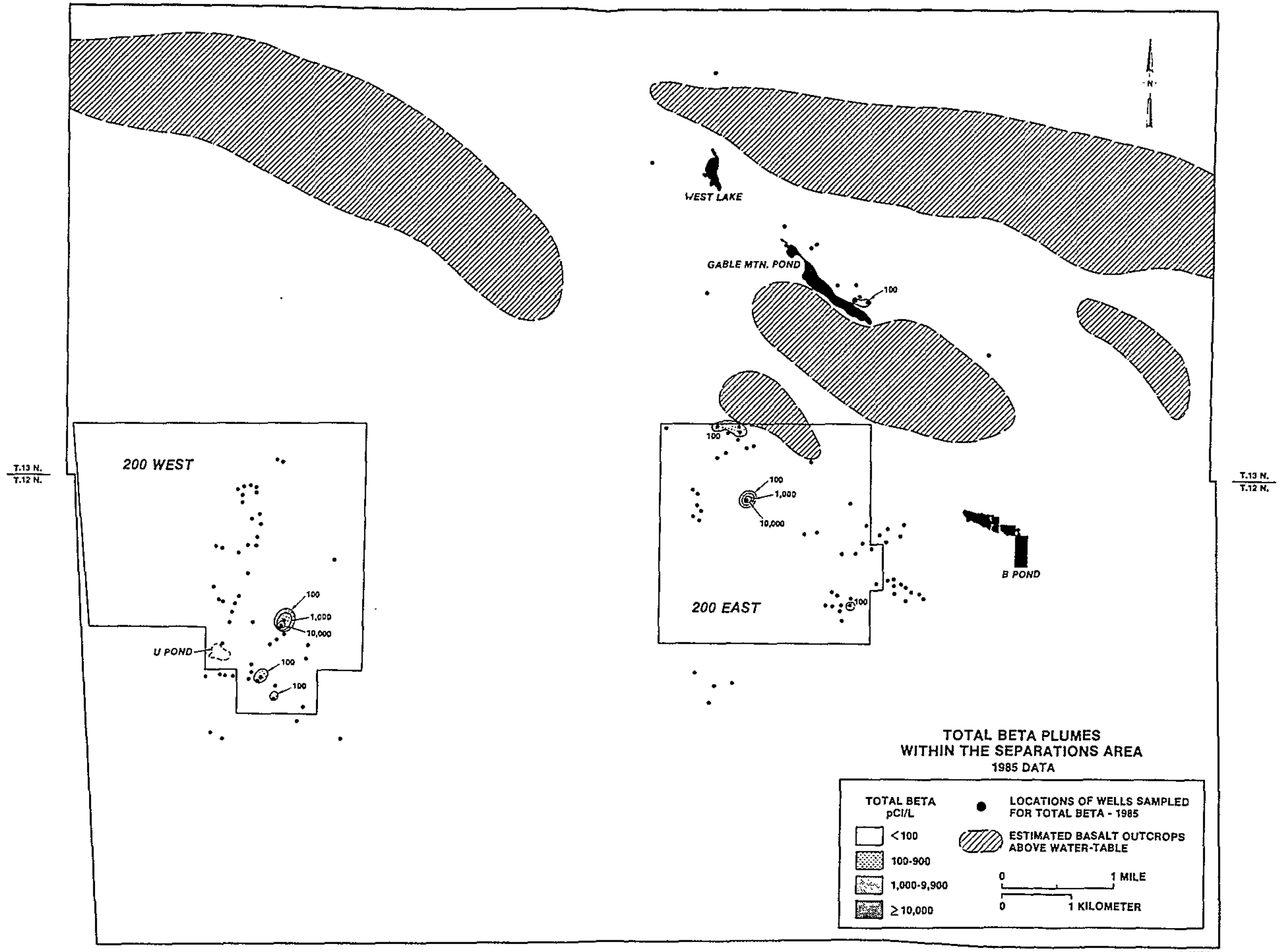

Figure 18. Total Beta Plume for the Separations Area, 1985.

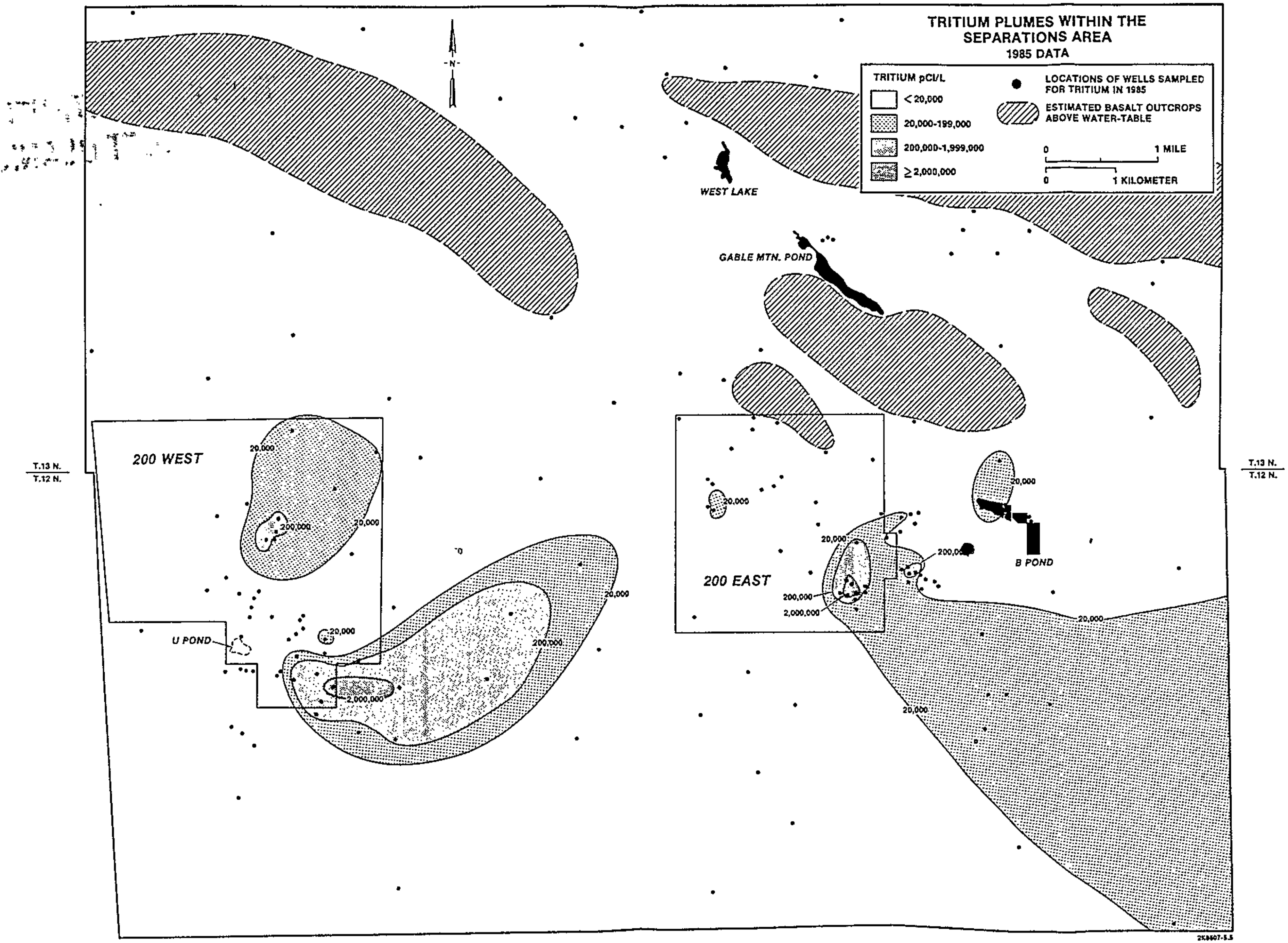

Figure 19. Tritium Plume Map for the Separations Area, 1985.

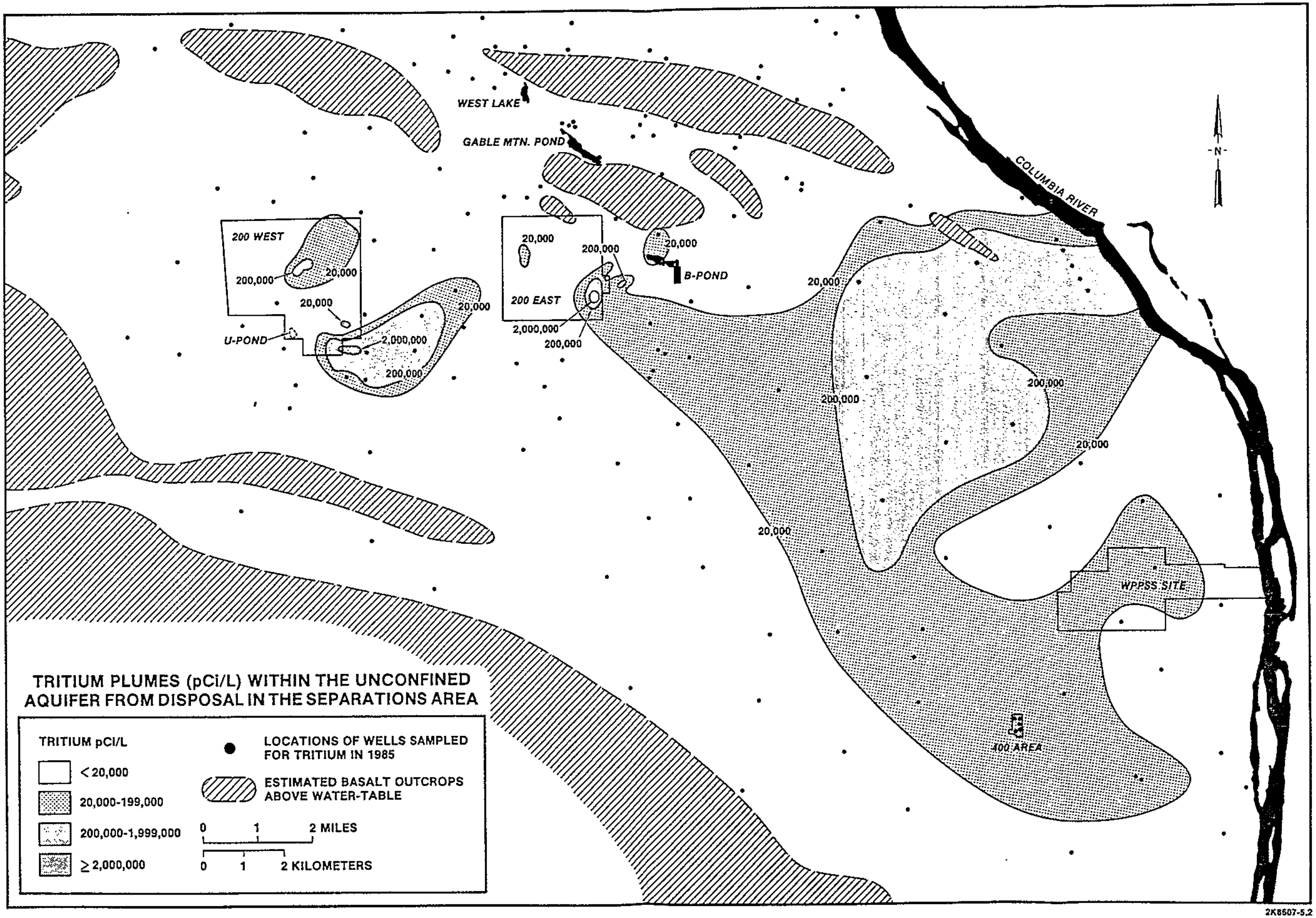

Figure 20. Tritium Plume Map for the Affected Area, 1985.

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recent operations. Figure 19 reveals that the tritium plume in the southeast corner of the 200 East Area extends southeasterly in a continuous manner toward the Columbia River, which was not the case in 1984 (Law et al. 1986). This change reflects increased average tritium concentration in wells 299-E17-6 and 299-E25-11 (see fig. A.2 in appendix A for location) in addition to the use of different isopleth lines. The tritium plume from prior operations in 200 East Area has moved eastward and divided into two lobes: one moving eastward to the Columbia River and the other moving southeasterly toward the 400 Area (see fig. 20).

6.3 NITRATE

Figure 21 shows the nitrate plume for the Separations Area. Nitrate (reported as nitrate) isopleths have been constructed for 5, 10, 20, and 45 mg/L. The greatest concentrations of nitrate surround the 216-A cribs, 216-B-62 crib, and the 216-BY cribs in 200 East Area; and the 216-T cribs 216-Z cribs, 216-U-1/2 cribs, and the 216-W-LWC crib in 200 West Area. The general flow pattern of the nitrate plume from the 200 Areas conforms to the general tritium plume flow pattern.

No map of nitrate distribution has been prepared for the affected area, as data for the 600 Area (i.e., the area outside the 100, 200, and 300 Areas) are collected by PNL and are still undergoing review.

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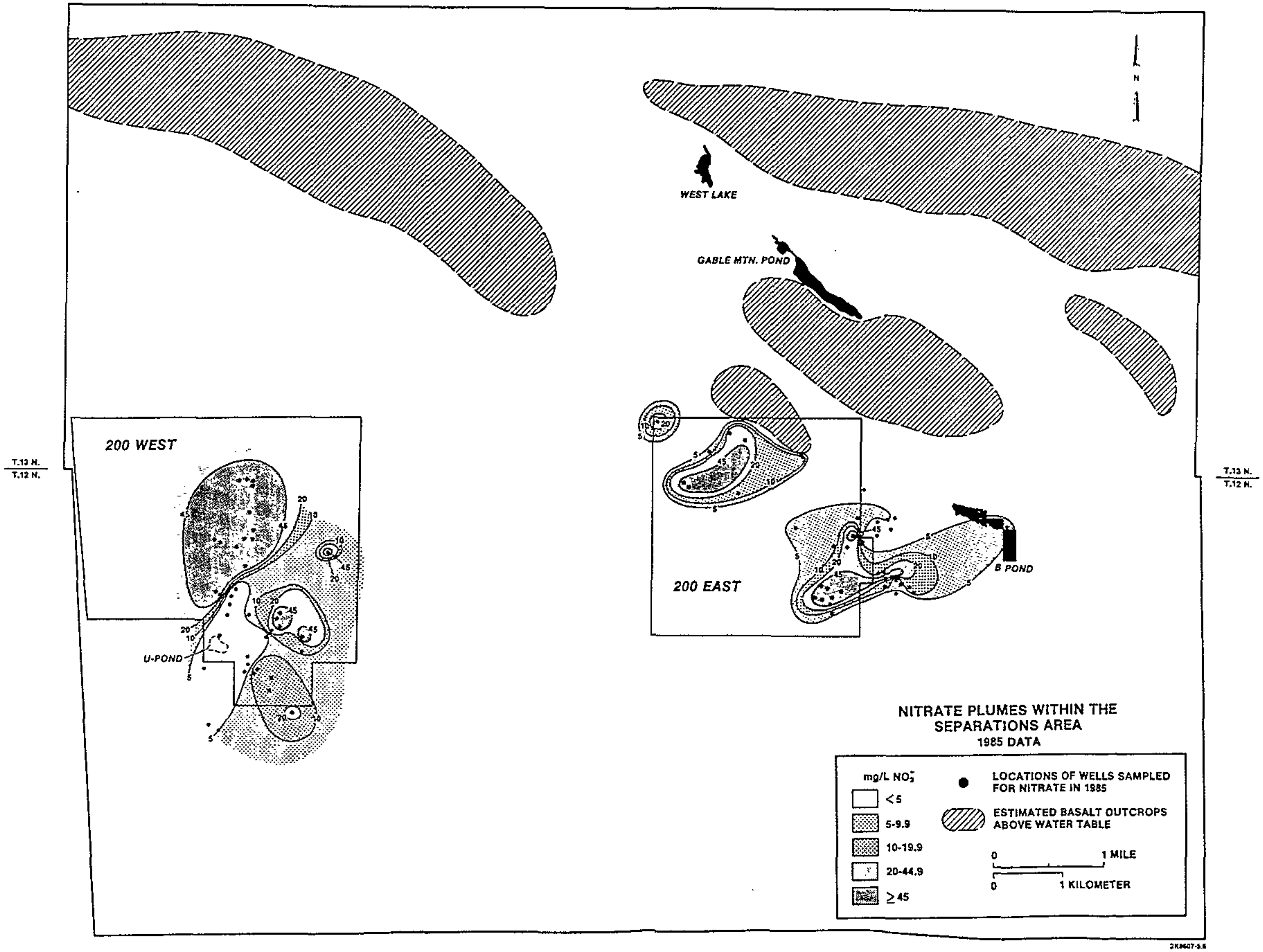

Figure 21. Nitrate Plume Map for the Separations Area, 1985.

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7.0 SPECIAL GROUND-WATER SAMPLE ANALYSES

Eight wells were selected for special sampling and analyses for ^{99}Tc and ^{129}I. Four of the wells selected were near cribs in 200 East Area affected by PUREX operation, and the other wells chosen were downgradient from operations in the 200 East and 200 West Areas.

Table 25 lists the results of ^{99}Tc and ^{129}I analyses conducted during 1985. Analyses of ^{129}I samples from four wells, which were near three cribs receiving PUREX waste, indicate that all are below Rockwell guidelines of 60 pCi/L. One of the four wells selected for monitoring past operations yielded a sample just over Rockwell guidelines, but samples from the other three wells are at least one order of magnitude lower. All of the ^{99}Tc sample results were below Rockwell guidelines of 20,000 pCi/L.

Table 25. Special Radionuclide Analyses of Ground-Water Samples in CY 1985.

	Crib 216-A-10 Well 299-E17-1	Crib 216-A-10 Well 299-E24-2	Crib 216-A-36B Well 299-E17-9	Crib 216-A37-1 Well 299-E25-20	Crib 216-S-7 Well 299-W22-14 (0)[a]	200 West Area Well 699-35-66	200 West Area Well 699-35-70	200 East Area Well 699-39-39
Results for ^{129}I (pCi/L)								
April	22.5	12.4	32.0	0.689	NR[b]	NR	NR	NR
May	14.5	10.6	20.5	0.347	4.42	6.97	66.9	0.000224
June	18.6	NR	28.0	NR	NR	NR	NR	NR
July	23.0	13.9	NR	0.312	NR	NR	NR	NR
August	34.0 26.7	33.4	22.8 32.4	0.483	7.07	5.72	57.1	0.0464
September	24.4	NR	30.2	NR	NR	NR	NR	NR
October	NR	NR	NR	0.871	NR	NR	NR	NR
November	25.2	17.1	26.1	NR	NR	NR	NR	NR
Results for ^{99}Tc (pCi/L)								
June	59.6	4.6	31.0	1.5	NR	NR	NR	NR

[a]Piezometer "0", which samples uppermost zone of aquifer.
[b]No analysis requested.

8.0 AQUIFER INTERCOMMUNICATION

The Elephant Mountain Member, the uppermost basalt in the Saddle Mountains Formation, serves as the bottom of the unconfined aquifer and the confining layer of the underlying Rattlesnake Ridge interbed. This sedimentary interbed is considered to be the uppermost confined aquifer in the Separations Area at Hanford.

A report (Graham et al. 1984) identifies areas of complete erosion of the Elephant Mountain basalt near West Lake and well 699-54-57, and suspected erosion near well 699-47-50 (fig. 22). A potential for downward migration of water from the unconfined aquifer to the confined aquifer, or aquifer intercommunication, exists if the water table of the unconfined aquifer is above the potentiometric surface of the confined aquifer and if the confining stratum is permeable or missing.

Aquifer intercommunication could result in contamination being introduced into the Rattlesnake Ridge confined aquifer. The report by Graham et al. (1984) concluded that a downward gradient in the eroded areas did not exist in June 1982.

Monitoring of water levels in the unconfined and confined aquifer continued in 1985, along with sample collection and analyses for the tracer constituents tritium and nitrate.

Results of the confined aquifer sampling program are given in appendix B.2. Well locations are shown in figure 22. Nitrate concentrations are low, with a maximum of 4.38 E+00 ppm and a minimum of 8.54 E-01 ppm. Tritium concentrations are also low, ranging from 5.65 E+01 pCi/L to 1.35 E+01 pCi/L. These tritium results are not directly comparable with those of Graham et al. (1984), since the analytical methods employed for the routine analysis reported herein are not as sensitive as those employed for the previous investigation. However, there is no indication of aquifer intercommunication during CY 1985.

A comparison of the water table of the unconfined aquifer and the potentiometric surface of the confined aquifer, based on December 1985 measurements, is depicted in figure 22. The area with a downward hydraulic gradient east of 200 East Area is slightly reduced from that reported for December 1984 (Law et al. 1986). This information also supports the position that there was no aquifer intercommunication during CY 1985.

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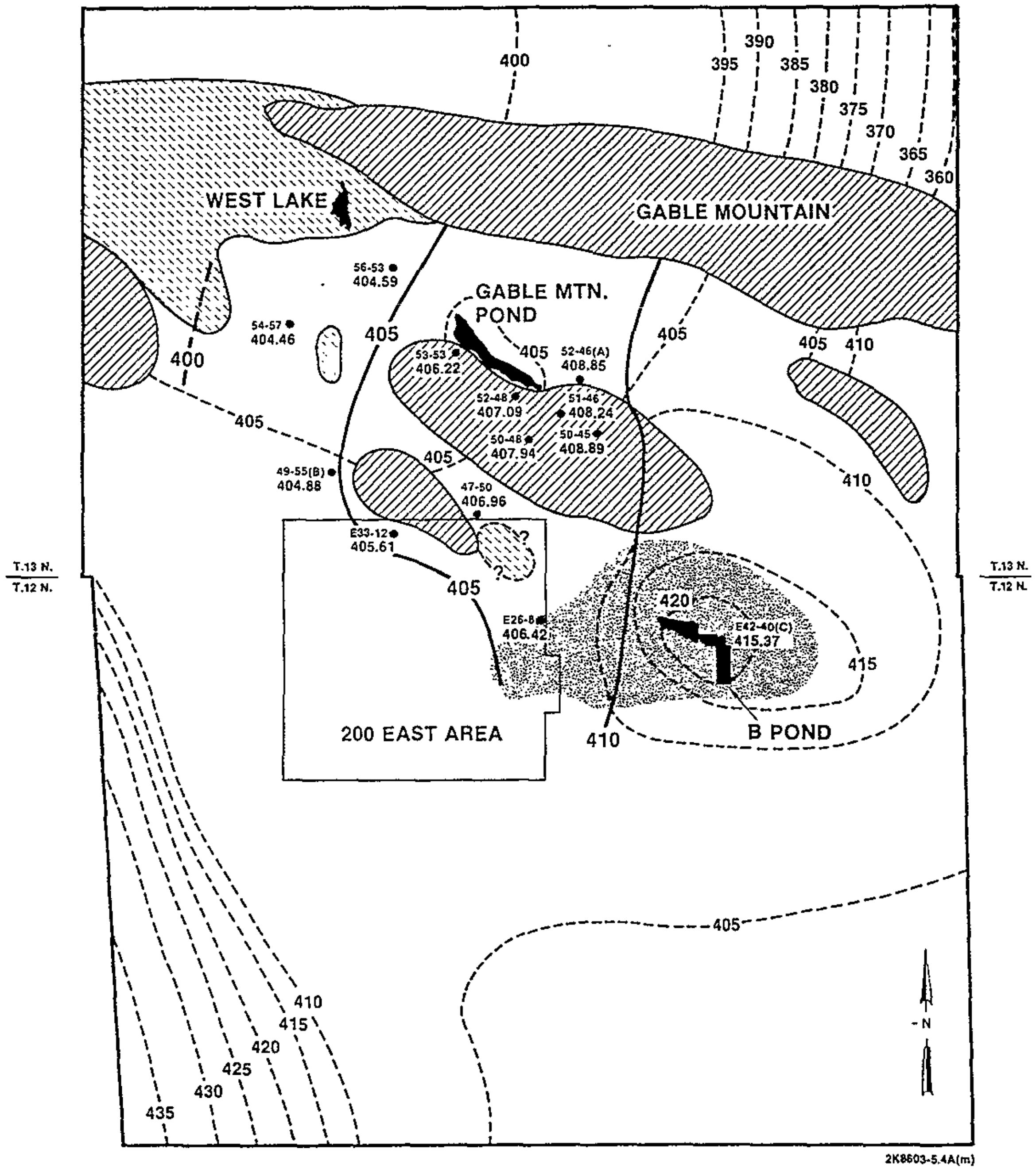

Rockwell International
Rockwell Hanford Operations

COMPARISON OF POTENTIOMETRIC SURFACE OF THE RATTLESNAKE RIDGE CONFINED AQUIFER WITH THE WATER TABLE OF THE UNCONFINED AQUIFER

DECEMBER 1985

—— 400 —— POTENTIOMETRIC SURFACE OF THE RATTLESNAKE RIDGE IN FEET ABOVE MEAN SEA LEVEL (ft MSL)

- - - -420- - - - WATER-TABLE CONTOURS IN FEET ABOVE MEAN SEA LEVEL (ft MSL)

AREAS OF COMPLETE EROSION OF THE ELEPHANT MOUNTAIN BASALT (from RHO-RE-ST-12)

AREAS OF DOWNWARD HYDRAULIC GRADIENT

53-50 ● CONFINED WELLS USED IN PREPARATION OF MAP

POND

BASALT OUTCROPS ABOVE WATER TABLE, AS INFERRED 6/1984

THE RATTLESNAKE RIDGE AQUIFER, WHICH IS CONFINED BY THE ELEPHANT MOUNTAIN BASALT, IS MONITORED MONTHLY IN THE EASTERN PORTION OF THE SEPARATIONS AREA. THE DECEMBER, 1985, WATER-LEVEL MEASUREMENTS IN 13 WELLS COMPLETED IN THE RATTLESNAKE RIDGE INTERBED WERE USED TO CONTOUR THE POTENTIOMETRIC SURFACE OF THE AQUIFER. AREAL EXTENT OF DOWNWARD HYDRAULIC GRADIENT FROM THE UNCONFINED AQUIFER TO THIS CONFINED AQUIFER IS INFERRED FROM THE WATER-TABLE MAP AND THE CONTOURS OF THE POTENTIOMETRIC SURFACE OF THE RATTLESNAKE RIDGE. THIS AREA REPRESENTS THE ZONE IN WHICH DOWNWARD FLOW MIGHT OCCUR IF A PATHWAY IS AVAILABLE, SUCH AS ABSENCE OF THE ELEPHANT MOUNTAIN BASALT DUE TO EROSION. SINCE DECEMBER, 1984, THE ZONE OF THE DOWNWARD HYDRAULIC GRADIENT HAS DECREASED IN SIZE.

THE POTENTIOMETRIC SURFACE OF THE RATTLESNAKE RIDGE CONFINED AQUIFER MAP IS PREPARED BY THE ENVIRONMENTAL TECHNOLOGY GROUP OF THE RESEARCH AND ENGINEERING FUNCTION OF ROCKWELL HANFORD OPERATIONS. DATA IS COLLECTED BY THE ENVIRONMENTAL EVALUATIONS SECTION OF PACIFIC NORTHWEST LABORATORY.

NOTE:
TO CONVERT TO METRIC, MULTIPLY ELEVATION (ft) BY 0.3048 TO OBTAIN ELEVATION (m).

0 1 MILE
0 1 KILOMETER

Figure 22. Comparison of Potentiometric Surface of the Rattlesnake Ridge of the Confined Aquifer with the Water Table of the Unconfined Aquifer.

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9.0 SUMMARY

The Separations Area ground-water monitoring network for CY 1985 consisted of 127 wells.

Samples from wells in the monitoring network were collected on a monthly, quarterly, or semiannual schedule, depending on the history of the liquid waste disposal site. Samples were analyzed selectively for total alpha, total beta, tritium, ^{90}Sr, ^{137}Cs, ^{60}Co, ^{106}Ru, total uranium and nitrate. The results of ground water monitoring indicate that average concentrations of contaminants in most wells were essentially the same in 1985 as in 1984.

For active cribs, the RHO-MA-139 guidelines for ^{90}Sr were exceeded in three wells near the 216-A-25 Pond. Information obtained in 1985 confirmed this is a localized situation. The second stage of pond deactivation was performed in 1985.

Guidelines for ^{238}U were exceeded at the 216-B-62 crib; the source of this uranium is under investigation. Elevated concentrations of uranium at the 216-U-16 crib resulted from past operation of the nearby inactive 216-U-1/2 cribs; the 216-U-16 crib was removed from service.

Inactive facilities exceeding Rockwell guidelines were the 216-B-5 reverse well, 216-S-1/2 cribs, 216-U-1/2 cribs, and the 216-U-10 pond. Remedial action was undertaken at the 216-U-1/2 cribs, with a resulting reduction in maximum uranium concentration from about 68,000 pCi/L before pumping to about 17,000 pCi/L after pumping. Disposal of the effluent from the ion exchange column to the 216-S-25 crib resulted in ground-water concentrations that exceeded Rockwell guidelines. Possible additional action is currently being evaluated.

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APPENDIX A

WELL NUMBERING SYSTEM, FACILITY NUMBERING SYSTEM, DEFINITION OF THE SEPARATIONS AREA, WELL LOCATION MAPS

CONTENTS

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APPENDIX A.1

WELL NUMBERING SYSTEM

A detailed description of the well numbering system is given in McGhan et al. (1985). The numbering system used for well identification in the 200 Areas is a three-part system, comprised of seven digits and one letter separated by dashes (i.e., 299-E25-21). The first set of digits (299) identifies it as a well (99) in one of the 200 Areas. The second part contains the prefix E or W for 200 East or 200 West Area, and is followed by a two-digit block number (E25). These block numbers are denoted on pages 10 and 11 of McGhan et al. (1985) for the 200 East and 200 West Areas. The third part (21) represents the consecutive numbering of a well constructed in a given block. For example, well 299-E25-21 is identified as the 21st well drilled in block 25 of 200 East Area. Computer-generated tables from the Hanford Ground-Water Data Base system presented in this report use a modification of the preceding numbering system (i.e., well 299-E25-21 is identified as 2-E25-21).

Wells in the 600 Area use a different coding system. The well identification number contains three parts. The first part (699) identifies it as a well (99) in the 600 Area. The second and third parts represent the north and west Hanford coordinates of a well expressed in 10,000 ft. For example, well 699-35-70 has the coordinates of N034523 and W069988 (McGhan et al. 1985). Letters are added when more than one well in a zone is described by the same coordinates, such as 699-42-40A and 699-42-40B. Computer-generated tables use the format 6-35-70 to represent well 699-35-70.

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APPENDIX A.2

FACILITY NUMBERING SYSTEM

The facility numbering system is a five- or six-digit, one-letter system separated with dashes (e.g., 216-A-37-2). Liquid waste disposal facilities (crib facilities, ponds, and ditches) are identified as 216-sites; Tank Farms as 241-sites.

The letter in the second part of the number represents a zone: A, B, C, E are zones in 200 East Area, and S, T, U, W, Z are zones in 200 West Area. The third part of the number represents consecutive numbering within a zone. In some cases, an additional identification tag has been included. For example, site 216-A-37-2 is the 37th liquid waste disposal site in Zone A of the 200 East Area. The (-2) differentiates this facility from 216-A-37-1. In other cases, a letter is added. For example, site 216-A-36B represents the 36th facility in block A of 200 East Area.

The facility number may be modified for use at Tank Farms. For example, 241-A Tank Farm, 241-AX Tank Farm, 241-AY Tank Farm, or 241-AZ Tank Farm. The third part of the Tank Farms numbering system is defined as the number assigned to that tank within the farm, such as 241-A-103 Tank.

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APPENDIX A.3

DEFINITION OF THE SEPARATIONS AREA

For the purpose of ground-water monitoring the Separations Area is defined on the basis of the U.S. Public Land System and is comprised of 80 sections of land in 6 townships as follows:

- T12N, R25E:* Sections 1, 2, 11, 12, 13, 14, 23, 24
- T12N, R26E: Sections 1 through 24
- T12N, R27E: Sections 5, 6, 7, 8, 17, 18, 19, 20
- T13N, R25E: Sections 13, 14, 23, 24, 25, 26, 35, 36
- T13N, R26E: Sections 13 through 36
- T13N, R27E: Sections 17, 18, 19, 20, 29, 30, 31, 32

These townships are referenced to the Williamette meridian. The location of these townships and sections with respect to the 200 East and 200 West Areas and other Hanford Site features is depicted in figure A.1.

*Read as "township 12 north, range 25 east."

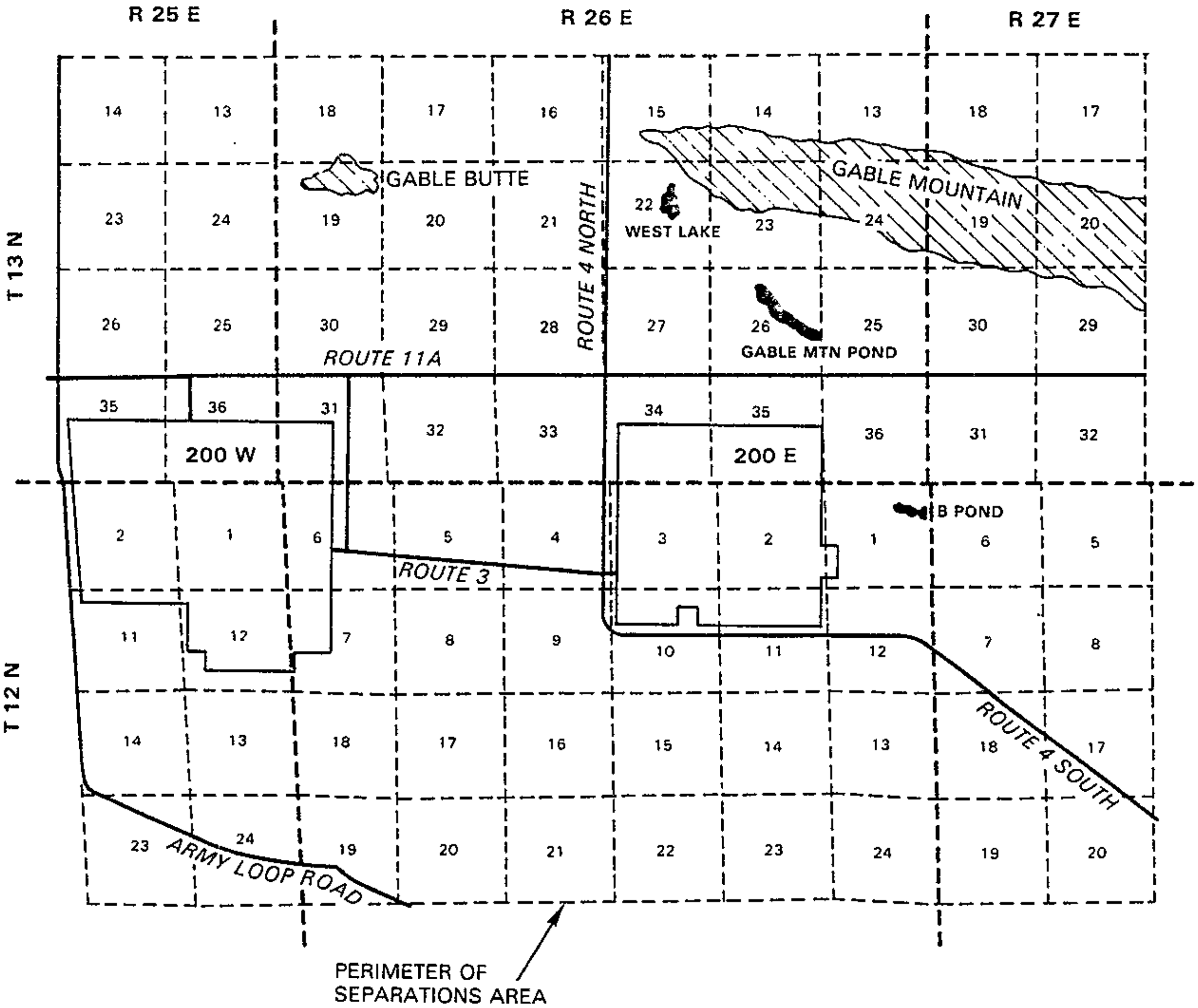

Figure A.1. Definition of the Separations Area for Ground-Water Monitoring.

APPENDIX A.4

WELL LOCATION MAPS

Well location maps for the Separations and the Affected Areas are shown in figures A.2 and A.3.

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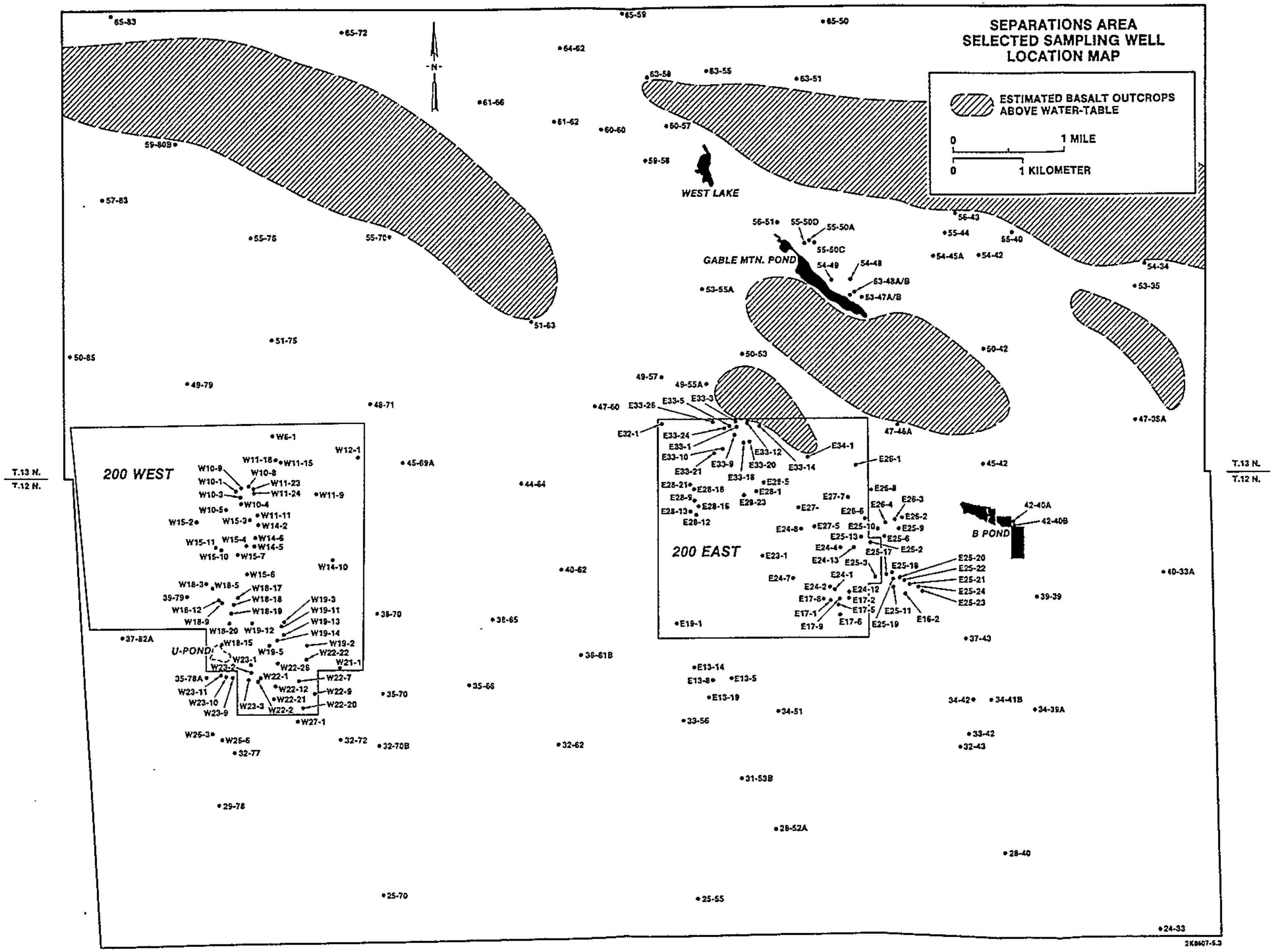

Figure A.2. Selected Sampling Wells in the Separations Area.

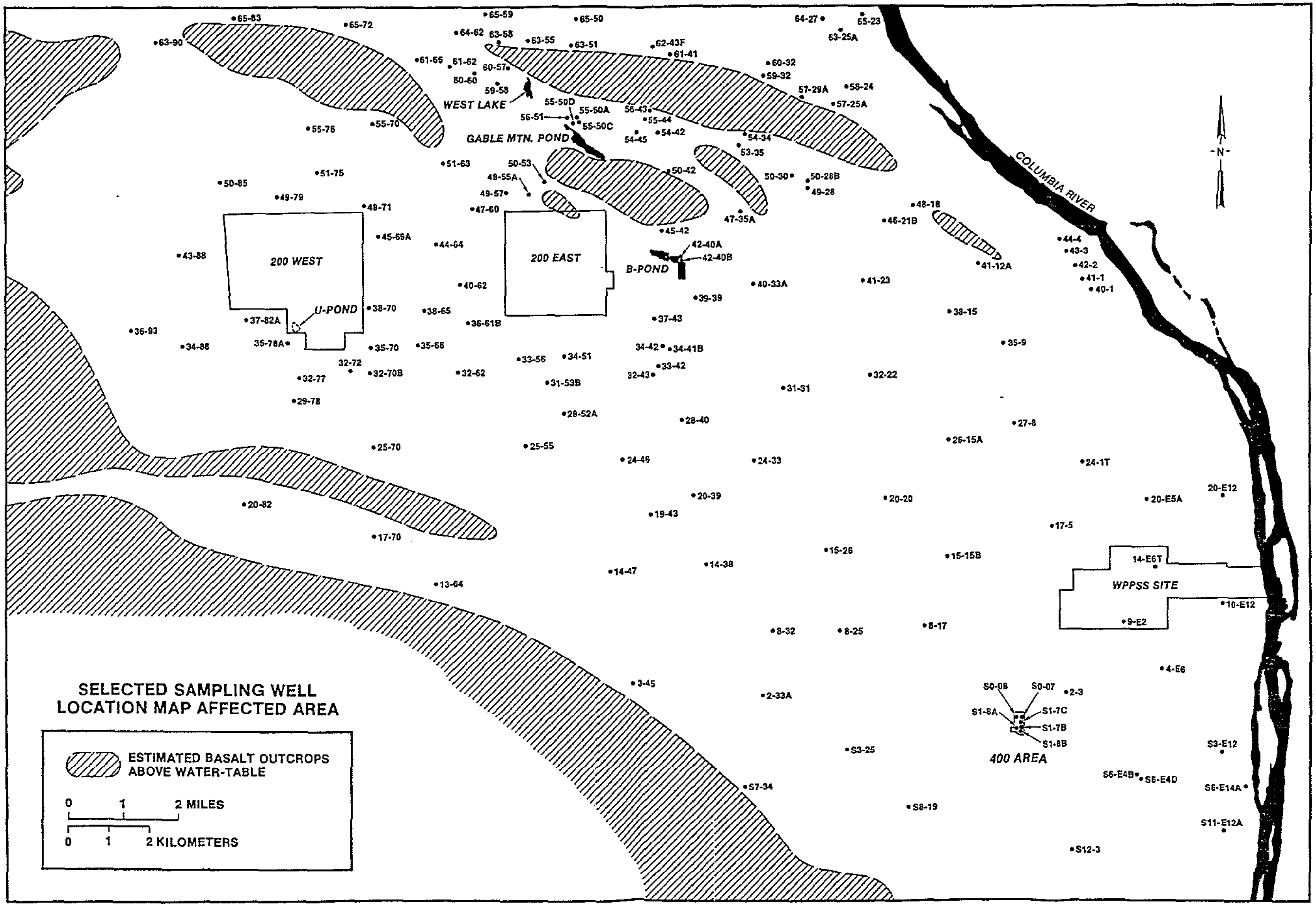

Figure A.3. Selected Sampling Wells in the Affected Area.

9 2 1 2 4 5 6 2 0 4 3

APPENDIX B

RESULTS OF THE UNCONFINED AND CONFINED AQUIFER GROUND-WATER MONITORING NETWORKS IN CY 1985

CONTENTS

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APPENDIX B.1

RESULTS OF THE UNCONFINED AQUIFER GROUND-WATER MONITORING NETWORK IN CY 1985

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Table B.1. Results of the Unconfined Aquifer Ground-Water Monitoring Network in CY 1985. (sheet 1 of 12)

Well no. (waste site)		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (pCi/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (µg/L)
	MAX		3.14E+01	-6.12E+00						
2-E13-5	AVE	NN**	1.80E+01	-1.22E+02	NN	NN	NN	NN	NN	NN
(216-B-18)*	MIN		4.55E+00	-2.37E+02						
	MAX		7.61E+00				2.41E+00	4.05E+00	5.40E+00	
2-E13-8	AVE	NN	6.44E+00	NN	NN	NN	-1.55E+00	1.93E+00	-4.55E+00	NN
(216-B-21)*	MIN		5.46E+00				-6.07E+00	-5.05E-01	-1.33E+01	
	MAX		7.76E+00							
2-E13-14	AVE	NN	6.68E+00	NN	NN	NN	NN	NN	NN	NN
(216-B-29)*	MIN		5.02E+00							
	MAX		9.95E+00							
2-E13-19	AVE	NN	8.55E+00	NN	NN	NN	NN	NN	NN	NN
(216-B-28)*	MIN		6.23E+00							
	MAX	2.67E+00	1.16E+01	2.94E+03	7.22E+00	3.51E-01	7.57E+00	1.18E+01	4.26E+01	
2-E16-2	AVE	1.59E+00	9.58E+00	7.53E+02	3.12E+00	1.42E-01	1.28E+00	-7.12E-01	1.08E+01	NN
(216-A-30)	MIN	8.66E-01	7.33E+00	7.10E+01	1.05E+00	-9.03E-02	-5.16E+00	-1.60E+01	-1.74E+01	
	MAX	8.39E+00	4.55E+01	5.62E+06	1.88E+02	4.23E+00	5.43E+00	6.79E+00	7.05E+01	
2-E17-1	AVE	4.18E+00	3.47E+01	2.40E+06	1.03E+02	2.96E+00	1.49E+00	1.94E+00	9.21E+00	NN
(216-A-10)	MIN	8.43E-01	2.02E+01	1.15E+06	6.51E+01	1.77E+00	-2.56E+00	-9.49E+00	-9.67E+01	
	MAX	2.12E+01	4.23E+02	4.32E+05	3.10E+02	5.98E+00	-2.10E+00	3.56E+01	2.75E+01	
2-E17-2	AVE	1.35E+01	1.86E+02	1.60E+05	2.10E+02	5.98E+00	-2.10E+00	3.56E+01	2.75E+01	NN
(216-A-27)	MIN	1.01E+01	4.65E+01	6.75E+04	1.06E+02	5.98E+00	-2.10E+00	3.56E+01	2.75E+01	
	MAX	1.20E+01	6.60E+01	2.71E+06	1.16E+02	5.14E+00	7.67E+00	7.89E+00	4.79E+01	2.26E+01
2-E17-5	AVE	8.29E+00	3.28E+01	2.03E+06	9.18E+01	3.14E+00	-4.65E-01	2.11E+00	-5.24E+00	1.17E+01
(216-A-36B)	MIN	5.56E+00	2.21E+01	1.31E+06	6.46E+01	2.32E+00	-1.41E+01	-1.82E+00	-8.01E+01	6.53E+00
	MAX		2.00E+01	1.29E+05	1.39E+01					
2-E17-6	AVE	NN	8.63E+00	3.44E+04	5.14E+00	NN	NN	NN	NN	NN
(200 East)	MIN		2.27E+00	-6.90E+01	3.19E-01					
	MAX		4.39E+01	3.60E+06	1.88E+02	5.64E-01	1.60E+00	4.51E+00	4.05E+01	
2-E17-8	AVE	NN	2.02E+01	7.16E+05	4.79E+01	4.24E-01	-1.45E+00	3.59E+00	2.22E+01	NN
(216-A-38)*	MIN		9.12E+00	5.41E+03	9.38E+00	1.82E-01	-4.63E+00	2.25E+00	-2.11E+01	
	MAX	6.08E+00	3.60E+01	5.56E+06	1.72E+02	4.71E+00	7.12E+00	7.11E+00	7.12E+01	5.91E+00
2-E17-9	AVE	3.54E+00	2.71E+01	4.68E+06	1.40E+02	4.17E+00	-4.87E-02	1.96E+00	1.32E+01	5.24E+00
(216-A-36A,B)	MIN	2.15E+00	2.20E+01	3.82E+06	1.08E+02	3.30E+00	-9.25E+00	-7.09E+00	-2.98E+01	4.56E+00

RHO-RE-SR-86-24 P

Table B.1. Results of the Unconfined Aquifer Ground-Water Monitoring Network in CY 1985. (sheet 2 of 12)

Well no. (waste site)		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (pCi/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (μg/L)
2-E24-1	MAX		5.09E+01	5.47E+06	3.09E+02	4.72E+00	5.34E+00	4.86E+00	6.53E+01	
(216-A-5)*	AVE	NN	3.57E+01	2.58E+06	1.55E+02	1.66E+00	-1.32E+00	1.29E+00	-4.88E+01	NN
	MIN		2.05E+01	1.34E+05	2.38E+01	5.60E-04	-8.01E+00	-4.55E+00	-1.48E+02	
2-E24-2	MAX	1.54E+01	5.38E+01	5.47E+06	2.61E+02	2.63E+00	5.44E+00	4.14E+00	4.10E+01	
(216-A-10)	AVE	6.72E+00	3.12E+01	2.12E+06	1.16E+02	1.55E+00	1.90E-01	-1.90E+00	-1.35E+01	NN
	MIN	1.49E+00	9.45E+00	3.88E+05	2.34E+01	4.42E-01	-2.85E+00	-9.48E+00	-1.41E+02	
2-E24-4	MAX	4.34E-01	7.66E+00	7.54E+04	8.45E+00	4.36E-01	5.69E+00	4.52E+00	5.92E+01	
(216-A-9)*	AVE	4.34E-01	5.72E+00	3.53E+04	5.88E+00	1.70E-01	1.88E+00	-1.82E+00	-6.48E+00	NN
	MIN	4.34E-01	2.20E+00	1.77E+04	4.12E+00	-2.05E-01	-1.28E+00	-7.09E+00	-9.03E+01	
2-E24-8	MAX		2.77E+01	7.84E+03	3.93E+01		4.87E+00	6.77E+00	4.19E+01	
(216-C-3,4,5)*	AVE	NN	1.53E+01	4.80E+03	9.79E+00	NN	9.98E-02	2.38E+00	1.36E+01	NN
	MIN		4.72E+00	1.73E+03	5.40E+00		-7.35E+00	-4.57E+00	-1.86E+01	
2-E24-12	MAX		3.63E+01	4.96E+05	3.44E+01					
(216-A-21,31)*	AVE	NN	3.14E+01	3.49E+05	2.94E+01	NN	NN	NN	NN	NN
	MIN		2.79E+01	2.45E+05	2.56E+01					
2-E24-13	MAX		5.25E+00		4.23E+01					
(241-A)	AVE	NN	4.39E+00	NN	2.24E+01	NN	NN	NN	NN	NN
	MIN		3.54E+00		2.43E+00					
2-E25-2	MAX		5.82E+00	1.91E+04	4.82E+00			4.50E+00		
(216-A-1,7)*	AVE	NN	5.32E+00	1.71E+04	2.59E+00	NN	NN	1.75E+00	NN	NN
	MIN		4.82E+00	1.51E+04	3.50E-01			-1.00E+00		
2-E25-3	MAX		1.08E+01							
(216-A-6)*	AVE	NN	7.31E+00	NN	NN	NN	NN		NN	NN
	MIN		5.27E+00							
2-E25-6	MAX	2.38E+00	1.20E+01	2.02E+04	3.52E+00	9.71E-01	4.82E+00	6.77E+00	5.93E+01	
(216-A-8)	AVE	1.45E+00	5.95E+00	1.25E+04	1.94E+00	3.06E-01	-8.07E-01	1.32E+00	5.02E-01	NN
	MIN	9.08E-01	3.71E+00	6.55E+03	9.34E-01	-5.85E-01	-5.92E+00	-7.85E+00	-9.25E+01	
2-E25-9	MAX	1.40E+00	5.06E+01	8.35E+03	3.35E+00	1.96E+00	5.75E+00	5.06E+00	5.47E+01	
(216-A-8)	AVE	7.50E-01	8.10E+00	4.54E+03	2.78E+00	4.44E-01	6.94E-01	9.60E-01	-6.75E+00	NN
	MIN	2.25E-01	2.70E+00	2.41E+02	2.34E+00	-2.02E-01	-6.07E+00	-1.11E+01	-1.12E+02	
2-E25-10	MAX	2.00E+00	7.24E+00				5.75E+00	6.07E+00	2.02E+01	2.93E+00
(216-A-18,	AVE	1.62E+00	6.22E+00	NN	NN	NN	4.63E+00	3.11E+00	-1.57E+00	2.11E+00
19,20)*	MIN	1.05E+00	5.47E+00				3.83E+00	1.52E+00	-5.06E+01	1.25E+00

Table B.1. Results of the Unconfined Aquifer Ground-Water Monitoring Network in CY 1985. (sheet 3 of 12)

Well no. (waste site)		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (pCi/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (µg/L)
	MAX		9.70E+00	1.06E+05	2.32E+01	6.62E-01	6.41E+00	5.63E+00	5.83E+01	
2-E25-11	AVE	NN	5.57E+00	4.76E+04	1.36E+01	2.53E-01	9.82E-01	1.64E+00	-9.66E+00	NN
(216-A-30)	MIN		2.69E+00	1.99E+04	7.13E+00	-7.96E-02	-5.86E+00	-1.70E+00	-9.56E+01	
	MAX		1.37E+01		2.80E+02					
2-E25-13	AVE	NN	1.23E+01	NN	2.07E+02	NN	NN	NN	NN	NN
(241-AX)	MIN		1.04E+01		1.33E+02					
	MAX	2.10E+00	1.12E+01	1.69E+05	1.98E+01	7.71E-01	3.44E+00	8.27E+00	5.98E+01	
2-E25-17	AVE	1.31E+00	6.79E+00	1.29E+05	1.37E+01	3.19E-01	-2.87E-01	4.53E+00	7.10E+00	NN
(216-A-37-1)	MIN	9.75E-01	4.01E+00	8.41E+04	4.21E+00	-3.75E-01	-8.54E+00	2.26E+00	-1.75E+01	
	MAX	2.05E+00	7.40E+00	2.12E+05	5.09E+01	1.08E+00	8.31E+00	5.64E+00	2.40E+01	
2-E25-18	AVE	1.78E+00	5.82E+00	1.53E+05	2.39E+01	6.16E-01	1.73E+00	2.38E+00	3.58E+00	NN
(216-A-37-1)	MIN	1.62E+00	4.49E+00	8.16E+04	1.28E+01	1.73E-01	-1.42E+00	-2.53E+00	-1.45E+01	
	MAX	2.47E+00	1.61E+01	9.88E+05	2.01E+02	7.50E-01	4.87E+00	5.91E+00	5.21E+01	
2-E25-19	AVE	1.06E+00	9.96E+00	6.01E+05	1.10E+02	4.42E-01	1.12E+00	-3.48E+00	1.55E+01	NN
(216-A-37-1)	MIN	3.20E-01	6.51E+00	3.49E+05	2.41E+01	2.34E-01	-3.56E+00	-1.45E+01	-3.81E+01	
	MAX	4.36E+00	1.55E+01	1.37E+06	2.80E+02	3.41E+00	3.10E+00	3.39E+00	7.96E+00	
2-E25-20	AVE	1.87E+00	1.34E+01	8.02E+05	1.98E+02	9.19E-01	1.10E+00	-1.22E+00	-2.23E+01	NN
(216-A-37-1)	MIN	5.23E-01	3.96E+00	3.25E+05	1.14E+02	-5.00E-01	-1.42E+00	-8.27E+00	-3.88E+01	
	MAX	5.14E+00	2.10E+01	1.46E+04	1.22E+01	1.91E+00	4.98E+00	7.27E+00	7.75E+01	
2-E25-21	AVE	2.61E+00	1.25E+01	2.84E+03	5.23E+00	3.56E-01	-7.00E-01	1.01E+00	4.01E+00	NN
(216-A-37-2)	MIN	9.08E-01	6.22E+00	-1.15E+03	1.32E+00	-2.42E-03	-6.97E+00	-1.69E+01	-5.39E+01	
	MAX	2.85E+00	1.23E+01	2.02E+04	4.30E+01	2.72E+00	4.15E+00	7.28E+00	5.04E+01	
2-E25-22	AVE	1.73E+00	8.50E+00	9.32E+03	9.39E+00	6.23E-01	-3.99E-01	8.17E-01	1.57E+00	NN
(216-A-37-2)	MIN	7.72E-01	4.67E+00	4.16E+03	2.89E+00	-2.30E-02	-7.99E+00	-9.09E+00	-2.95E+01	
	MAX	1.05E+00	1.57E+01	1.24E+03	4.20E+01	1.19E+00	4.27E+00	9.72E+00	8.60E+01	
2-E25-23	AVE	6.19E-01	1.17E+01	3.04E+02	1.21E+01	2.54E-01	-1.73E+00	5.51E-01	3.79E-01	NN
(216-A-37-2)	MIN	-6.99E-02	5.33E+00	1.15E+01	5.10E-01	-6.84E-01	-1.02E+01	-8.10E+00	-8.60E+01	
	MAX	2.44E+00	1.50E+02	1.24E+03	5.40E+01	1.12E+00	6.19E+00	5.93E+00	5.38E+01	
2-E25-24	AVE	1.39E+00	2.25E+01	5.22E+02	1.59E+01	3.30E-01	-1.18E+00	6.49E-01	1.86E+01	NN
(216-A-37-2)	MIN	7.65E-01	6.68E+00	-1.72E+01	3.84E+00	-2.08E-01	-1.17E+01	-2.95E+00	-4.78E+01	
	MAX		1.06E+01	7.04E+03	3.52E+00					
2-E26-2	AVE	NN	6.33E+00	4.82E+03	2.94E+00	NN	NN	NN	NN	NN
(216-A-24)*	MIN		4.46E+00	2.59E+03	2.04E+00					

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Table B.1. Results of the Unconfined Aquifer Ground-Water Monitoring Network in CY 1985. (sheet 4 of 12)

Well no. (waste site)		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (pCi/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (µg/L)
	MAX		5.64E+00	1.35E+05	5.36E+00					
2-E26-4	AVE	NN	5.03E+00	7.93E+04	3.70E+00	NN	NN	NN	NN	NN
(216-A-24)*	MIN		4.43E+00	1.53E+04	2.16E+00					
	MAX	3.20E-01	2.96E+00	1.53E+03	7.30E+00					
2-E26-6	AVE	3.20E-01	2.96E+00	1.53E+03	7.30E+00	NN	NN	NN	NN	NN
(401-A)	MIN	3.20E-01	2.96E+00	1.53E+03	7.30E+00					
	MAX		1.98E+01				3.56E+00	6.09E+00	2.91E+00	
2-E27-5	AVE	NN	1.39E+01	NN	NN	NN	-4.33E-02	3.03E+00	7.00E-02	NN
(216-C-10)*	MIN		9.62E+00				-2.09E+00	5.91E-01	-2.70E+00	
	MAX	1.43E+01	5.19E+00		7.70E+01					
2-E27-7	AVE	4.83E+00	4.64E+00	NN	2.25E+01	NN	NN	NN	NN	NN
(241-C)	MIN	1.00E+00	4.19E+00		2.93E+00					
	MAX	1.23E+01	1.46E+01							1.30E+01
2-E28-9	AVE	7.54E+00	1.24E+01	NN	NN	NN	NN	NN	NN	1.13E+01
(216-B-12)*	MIN	2.89E+00	9.27E+00							9.40E+00
	MAX		2.68E+01	1.37E+05			2.85E+00	5.90E+00	3.46E+01	
2-E28-12	AVE	NN	1.59E+01	9.25E+04	NN	NN	-9.26E-01	-1.72E+00	-2.32E+01	NN
(216-B-55)	MIN		5.93E+00	3.16E+04			-2.85E+00	-7.11E+00	-1.04E+02	
	MAX		1.08E+01	8.62E+03			5.57E+00	9.67E+00	5.60E+01	
2-E28-13	AVE	NN	7.43E+00	6.59E+03	NN	NN	-1.08E+00	5.32E-01	-9.72E-01	NN
(216-B-55)	MIN		3.44E+00	4.42E+03			-5.85E+00	-1.06E+01	-1.34E+02	
	MAX	9.05E+00	1.14E+01							1.08E+01
2-E28-16	AVE	8.14E+00	1.06E+01	NN	NN	NN	NN	NN	NN	1.00E+01
(216-B-12)*	MIN	6.15E+00	9.68E+00							7.99E+00
	MAX	3.95E+01								
2-E28-17	AVE	1.92E+01	NN	NN	NN	NN	NN	NN	NN	NN
(216-B-6,10B)*	MIN	1.10E+00								
	MAX	2.44E+02	8.49E+01	2.58E+04	1.59E+02	2.24E+00	6.27E+00	4.83E+00	5.34E+01	4.24E+02
2-E28-18	AVE	1.42E+02	6.27E+01	1.57E+04	1.17E+02	7.47E-01	2.81E-01	-1.51E+00	-1.31E-01	2.59E+02
(216-B-62)	MIN	4.70E+01	3.33E+01	8.60E+03	7.88E+01	-1.30E-01	-1.06E+01	-1.33E+01	-7.83E+01	1.80E+02
	MAX	1.86E+02	7.48E+01	2.27E+04	1.58E+02	1.10E+00	8.55E+00	8.31E+00	5.10E+01	3.21E+02
2-E28-21	AVE	1.44E+02	4.62E+01	1.51E+04	8.75E+01	4.19E-01	-1.87E+00	-3.23E-01	5.59E+00	1.88E+02
(216-B-62)	MIN	8.84E+01	2.79E+01	7.37E+03	6.15E+01	-2.72E-01	-8.70E+00	-1.07E+01	-4.56E+01	1.10E+02

Table B.1. Results of the Unconfined Aquifer Ground-Water Monitoring Network in CY 1985. (sheet 5 of 12)

Well no. (waste site)		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (pCi/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (μg/L)
2-E28-23 (216-B-5)*	MAX	1.04E+02	2.15E+04	8.62E+03	1.73E+01	8.01E+03	4.12E+03	3.39E+00	5.97E+01	NN
	AVE	9.84E+01	1.70E+04	6.75E+03	1.36E+01	6.95E+03	3.57E+03	-6.72E-01	-8.72E+01	
	MIN	8.83E+01	1.40E+04	4.88E+03	9.30E+00	5.95E+03	3.13E+03	-4.22E+00	-3.94E+02	
2-E32-1 (200 East)	MAX	NN	2.92E+01	5.12E+03	3.64E+01	NN	NN	NN	NN	NN
	AVE		2.49E+01	4.42E+03	2.81E+01					
	MIN		2.05E+01	3.71E+03	1.98E+01					
2-E33-1 (216-B-43)*	MAX	NN	2.25E+02	NN	NN	1.20E-01	4.88E+00	2.06E+01	4.73E+01	NN
	AVE		1.47E+02			1.20E-01	2.15E+00	7.25E+00	9.95E+00	
	MIN		3.88E+01			1.20E-01	-2.09E+00	-5.46E+00	-1.16E+01	
2-E33-3 (216-B-44, 45,46)*	MAX	NN	1.19E+03	3.39E+03	NN	8.76E-01	6.39E+00	2.32E+02	5.88E+01	NN
	AVE		7.80E+02	2.54E+03		5.13E-01	-8.97E-01	1.46E+02	1.36E+01	
	MIN		4.89E+02	1.31E+03		2.86E-01	-1.14E+01	7.11E+01	-3.93E+01	
2-E33-5 (216-B-47)*	MAX	NN	5.71E+02	NN	NN	1.67E-01	7.19E+00	2.93E+01	4.05E+01	NN
	AVE		3.07E+02			1.67E-01	2.30E+00	2.16E+01	-4.57E+00	
	MIN		1.99E+02			1.67E-01	-3.84E+00	1.33E+01	-1.06E+02	
2-E33-7 (216-B-48, 49,50)*	MAX	NN	7.90E+02	NN	NN	NN	1.04E+00	1.14E+02	-1.34E+01	NN
	AVE		6.60E+02				8.40E-01	9.80E+01	-2.90E+01	
	MIN		5.30E+02				6.39E-01	8.20E+01	-4.46E+01	
2-E33-8 (216-B-41)*	MAX	NN	1.40E+02	NN	NN	3.29E-01	2.85E+00	1.09E+01	1.49E+01	NN
	AVE		8.87E+01			3.29E-01	1.32E+00	-6.50E-02	6.30E-01	
	MIN		5.86E+01			3.29E-01	3.48E-01	-5.33E+00	-2.71E+01	
2-E33-9 (241-BY)	MAX	NN	1.73E+02	1.11E+03	4.56E+01	7.96E-01	1.07E+01	5.46E+01	4.26E+01	NN
	AVE		8.28E+01	7.37E+02	3.25E+01	7.16E-01	8.11E+00	2.36E+01	6.10E+00	
	MIN		3.10E+01	4.08E+02	1.11E+01	5.56E-01	5.43E+00	6.77E+00	-6.39E+01	
2-E33-10 (216-B-35,41)*	MAX	NN	8.06E+00	1.98E+03	5.98E+00	NN	-4.27E+00	2.37E+00	-3.02E+00	NN
	AVE		7.49E+00	1.27E+03	5.87E+00		-7.44E+00	9.32E-01	-6.86E+00	
	MIN		6.91E+00	5.64E+02	5.75E+00		-1.06E+01	-5.06E-01	-1.07E+01	
2-E33-18 (216-B-7A,7B)*	MAX	NN	1.41E+01	NN	NN	6.38E-01	7.65E+00	4.51E+00	6.07E+01	NN
	AVE		1.18E+01			1.81E-01	3.05E+00	-1.54E+00	1.32E+01	
	MIN		1.08E+01			-4.82E-01	-2.07E+00	-4.55E+00	-2.36E+01	
2-E33-20 (216-B-7A,7B, 11A,11B)*	MAX	NN	1.64E+01	NN	7.61E+01	3.18E+00	NN	NN	NN	NN
	AVE		1.26E+01		4.01E+01	2.16E+00				
	MIN		1.03E+01		2.11E+01	1.40E+00				

Table B.1. Results of the Unconfined Aquifer Ground-Water Monitoring Network in CY 1985. (sheet 6 of 12)

Well no. (waste site)		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (pCi/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (μg/L)
	MAX		9.36E+00				3.13E+00	2.37E+00	2.66E+01	
2-E33-21	AVE	NN	6.80E+00	NN	NN	NN	1.08E-01	5.18E-01	-1.81E+01	NN
(216-B-36)*	MIN		4.65E+00				-2.56E+00	-3.54E+00	-7.24E+01	
	MAX		9.63E+01			5.06E-02	8.36E+00	2.83E+00	2.99E+00	
2-E33-24	AVE	NN	6.45E+01	NN	NN	5.06E-02	1.45E+00	-5.10E+00	-4.57E+01	NN
(216-B-57)*	MIN		4.64E+01			5.06E-02	-4.87E+00	-1.45E+01	-1.43E+02	
	MAX	4.68E+00	2.29E+02			1.99E-01	5.70E+00	2.26E+01	2.38E+01	
2-E33-26	AVE	2.76E+00	1.80E+02	NN	NN	1.99E-01	2.15E-01	1.07E+01	5.15E+00	NN
(216-B-61)*	MIN	1.80E+00	1.30E+02			1.99E-01	-5.16E+00	1.77E+00	-2.71E+01	
	MAX	3.09E+00	1.13E+01	1.31E+03	1.33E+01		5.51E+00	4.52E+00	3.21E+01	
2-E34-1	AVE	1.95E+00	8.01E+00	4.59E+02	1.13E+01	NN	5.36E-01	-2.66E+00	-9.56E+00	NN
(216-B-63)*	MIN	5.20E-01	5.43E+00	-3.22E+01	9.38E+00		-5.51E+00	-1.02E+01	-4.10E+01	
	MAX		2.92E+01							
2-W10-1	AVE	NN	2.62E+01	NN	NN	NN	NN	NN	NN	NN
(216-T-5)*	MIN		0.29E+01							
	MAX	1.13E+01	1.60E+02							
2-W10-3	AVE	6.76E+00	9.18E+01	NN	NN	NN	NN	NN	NN	NN
(216-T-32)*	MIN	2.22E+00	2.37E+01							
	MAX		6.21E+01				9.05E+00	1.22E+01	4.75E+01	
2-W10-4	AVE	NN	5.13E+01	NN	NN	NN	2.72E+00	8.24E+00	1.64E+01	NN
(216-T-36)*	MIN		3.97E+01				-4.16E+00	1.69E+00	-1.10E+01	
	MAX	4.62E+00	6.07E+01		3.81E+02	5.94E-01	-1.28E+00	2.13E+01	4.83E+01	
2-W10-8	AVE	2.18E+00	5.25E+01	NN	2.19E+02	5.94E-01	-4.81E+00	1.35E+01	1.08E+01	NN
(241-T)	MIN	1.02E+00	3.61E+01		1.01E+02	5.94E-01	-9.59E+00	4.52E+00	-2.92E+01	
	MAX	2.40E+00	5.43E+01		5.13E+02	-9.58E-02	7.12E-01	1.35E+01	1.91E+01	
2-W10-9	AVE	2.09E+00	4.81E+01	NN	3.91E+02	-9.58E-02	-3.10E+00	1.13E+01	7.75E-01	NN
(241-T)	MIN	1.34E+00	4.17E+01		2.96E+02	-9.58E-02	-7.99E+00	6.60E+00	-2.32E+01	
	MAX	2.87E+00	5.66E+01			2.27E-01	1.03E+00	9.47E+00	-1.81E+01	
2-W11-11	AVE	2.54E+00	4.48E+01	NN	NN	2.27E-01	-2.98E+00	3.87E+00	-3.37E+01	NN
(216-T-8)*	MIN	2.18E+00	2.54E+01			2.27E-01	-7.12E+00	-2.95E+00	-5.32E+01	
	MAX		1.86E+01							
2-W11-15	AVE	NN	1.70E+01	NN	NN	NN	NN	NN	NN	NN
(216-T-34)*	MIN		1.53E+01							

Table B.1. Results of the Unconfined Aquifer Ground-Water Monitoring Network in CY 1985. (sheet 7 of 12)

Well no. (waste site)		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (pCi/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (µg/L)
	MAX		8.50E+01			3.61E-01				
2-W11-18 (216-T-35)*	AVE	NN	6.18E+01	NN	NN	3.61E-01	NN	NN	NN	NN
	MIN		5.26E+01			3.61E-01				
	MAX	4.56E+00	6.09E+01		3.55E+02	4.34E-01	2.24E+00	2.59E+01	4.51E+01	
2-W11-23 (241-T)	AVE	3.87E+00	5.57E+01	NN	3.03E+02	4.34E-01	-1.27E+00	1.73E+01	2.28E+01	NN
	MIN	3.11E+00	5.03E+01		2.74E+02	4.34E-01	-6.56E+00	8.61E+00	-1.77E+01	
	MAX	2.15E+00	6.17E+01		3.47E+02	-7.43E-01	7.67E+00	1.42E+01	3.24E+01	
2-W11-24 (241-T)	AVE	1.67E+00	5.98E+01	NN	3.04E+02	-7.43E-01	3.56E+00	1.11E+01	-3.28E+01	NN
	MIN	1.27E+00	5.80E+01		2.58E+02	-7.43E-01	1.42E+00	8.59E+00	-7.68E+01	
	MAX	3.38E+00	3.48E+01	2.30E+05						
2-W14-2 (216-T-26, 27,28)*	AVE	2.45E+00	2.99E+01	2.17E+05	NN	NN	NN	NN	NN	NN
	MIN	1.56E+00	2.36E+01	1.99E+05						
	MAX		1.66E+01	3.96E+05	1.70E+02					
2-W14-5 (241-TX)	AVE	NN	1.30E+01	1.24E+05	8.94E+01	NN	NN	NN	NN	NN
	MIN		9.41E+00	8.37E+03	2.39E+01					
	MAX		1.25E+01	5.40E+05	2.65E+02					
2-W14-6 (241-TX)	AVE	NN	1.17E+01	4.08E+05	1.68E+02	NN	NN	NN	NN	NN
	MIN		1.09E+01	1.92E+05	7.97E+01					
	MAX	5.58E+00	1.83E+01	3.91E+02	9.83E+01	6.52E-01	7.67E+00	5.66E+00	4.76E+01	
2-W14-10 (216-W-LWC)	AVE	3.69E+00	7.88E+00	2.13E+02	7.21E+01	2.94E-01	2.81E+00	2.33E+00	3.06E+00	NN
	MIN	1.38E+00	4.62E+00	-5.17E+01	4.52E+01	-1.90E-01	-5.34E+00	-2.53E+00	-4.09E+01	
	MAX		4.35E+01		1.37E+02		3.10E+00	7.10E+00	-2.70E+00	
2-W15-3 (241-TY)	AVE	NN	3.62E+01	NN	1.17E+02	NN	-1.62E+00	3.66E+00	-2.14E+01	NN
	MIN		2.55E+01		9.38E+01		-8.63E+00	0.00E+00	-3.20E+01	
	MAX		1.17E+01	8.03E+05	8.27E+02					
2-W15-4 (216-T-19)*	AVE	NN	9.86E+00	7.04E+05	7.75E+02	NN	NN	NN	NN	NN
	MIN		7.92E+00	5.92E+05	7.48E+02					
	MAX	1.97E+00	1.52E+01		3.00E+01					
2-W15-6 (216-Z-9)*	AVE	1.18E+00	1.01E+01	NN	1.55E+01	NN	NN	NN	NN	NN
	MIN	5.74E-01	6.46E+00		9.43E+00					
	MAX	9.01E+00	6.17E+01		1.95E+02		8.31E+00	3.15E+01	1.52E+01	
2-W15-7 (216-Z-7)*	AVE	3.32E+00	4.14E+01	NN	1.17E+02	NN	2.40E+00	2.09E+01	-2.24E+01	NN
	MIN	1.15E+00	1.36E+01		6.64E+01		-2.49E+00	3.39E+00	-4.32E+01	

Table B.1. Results of the Unconfined Aquifer Ground-Water Monitoring Network in CY 1985. (sheet 8 of 12)

Well no. (waste site)		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (pCi/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (μg/L)
	MAX	2.29E+00	1.78E+01		1.63E+02					
2-W15-10	AVE	1.63E+00	1.51E+01	NN	1.49E+02	NN	NN	NN	NN	NN
(216-Z-16)*	MIN	7.24E-01	1.25E+01		1.32E+02					
	MAX	4.45E+00	2.58E+01		2.94E+02					
2-W15-11	AVE	2.91E+00	2.04E+01	NN	2.33E+02	NN	NN	NN	NN	NN
(216-Z-16)*	MIN	2.04E+00	1.73E+01		1.53E+02					
	MAX	2.28E+00	4.40E+00							
2-W18-5	AVE	1.17E+00	3.78E+00	NN	NN	NN	NN	NN	NN	NN
(216-Z-12)*	MIN	4.83E-01	3.31E+00							
	MAX	1.01E+01	1.56E+01		1.99E+03					
2-W18-9	AVE	4.93E+00	1.09E+01	NN	1.04E+03	NN	NN	NN	NN	NN
(216-Z-18)*	MIN	1.99E+00	5.81E+00		2.36E+02					
	MAX	1.10E+01	4.24E+01	2.88E+02	5.80E+02					2.10E+00
2-W18-12	AVE	2.23E+00	1.17E+01	2.36E+02	2.98E+02	NN	NN	NN	NN	1.71E+00
(216-Z-18)*	MIN	3.99E-01	4.37E+00	1.68E+02	1.24E+01					1.15E+00
	MAX	5.52E+01	1.97E+01	5.84E+02	2.76E+01		3.84E+00	6.07E+00	6.83E+01	6.84E+01
2-W18-15	AVE	4.13E+01	1.54E+01	1.39E+02	3.38E+00	NN	-1.11E+00	-1.07E+00	-1.67E+01	5.72E+01
(216-U-10)*	MIN	2.75E+01	1.31E+01	-2.23E+01	3.50E-01		-6.76E+00	-8.10E+00	-1.78E+02	4.74E+01
	MAX	8.12E-01	4.51E+00	3.15E+02	2.84E+00		2.75E+00	6.79E+00	7.65E+01	
2-W18-17	AVE	2.79E-01	3.86E+00	2.90E+02	2.68E+00	NN	-6.92E-01	-1.83E+00	2.56E+01	NN
(216-Z-20)	MIN	-5.08E-02	2.93E+00	2.66E+02	2.54E+00		-4.47E+00	-1.06E+01	-5.81E+00	
	MAX	6.97E-01	4.94E+00	9.42E+02	4.32E+00		5.70E+00	7.10E+00	4.62E+01	
2-W18-18	AVE	3.56E-01	2.84E+00	1.49E+02	1.67E+00	NN	2.34E+00	-2.01E+00	6.28E+00	NN
(216-Z-20)	MIN	1.37E-01	2.01E+00	-2.07E+02	3.19E-01		-2.56E+00	-1.48E+01	-3.83E+01	
	MAX	1.08E+00	5.80E+00	4.80E+03	5.67E+01		4.63E+00	5.91E+00	4.15E+01	
2-W18-19	AVE	5.57E-01	4.11E+00	4.64E+02	1.40E+01	NN	-1.44E+00	-5.86E-01	-4.85E+00	NN
(216-Z-20)	MIN	4.90E-02	6.32E-02	-2.54E+02	1.46E+00		-8.26E+00	-9.49E+00	-7.16E+01	
	MAX	5.97E-01	7.27E+00	5.13E+01	2.93E+00		3.44E-01	4.84E+00	6.99E+01	
2-W18-20	AVE	3.73E-01	4.87E+00	4.08E+01	1.77E+00	NN	-3.33E+00	1.42E+00	7.59E+00	NN
(216-Z-20)	MIN	2.50E-01	2.44E+00	3.02E+01	8.01E-01		-8.95E+00	-5.09E+00	-5.59E+01	
	MAX	3.52E+00	5.98E+01	8.10E+04	2.74E+02	5.55E-01				4.05E+00
2-W19-2	AVE	3.52E+00	4.66E+01	7.03E+04	2.39E+02	5.55E-01	NN	NN	NN	2.59E+00
(216-U-8)*	MIN	3.52E+00	3.03E+01	6.15E+04	2.10E+02	5.55E-01				6.56E-01

Table B.1. Results of the Unconfined Aquifer Ground-Water Monitoring Network in CY 1985. (sheet 9 of 12)

Well no. (waste site)		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (pCi/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (μg/L)
	MAX	1.09E+04	6.58E+03	6.04E+03	1.55E+03	2.00E+00	6.20E+00	1.64E+01	1.48E+01	1.45E+04
2-W19-3	AVE	7.75E+03	3.55E+03	4.37E+03	7.15E+02	2.00E+00	-1.86E+00	1.21E+01	-3.14E+01	1.26E+04
(216-U-1,2)*	MIN	5.69E+03	1.58E+03	1.53E+03	8.19E+01	2.00E+00	-7.31E+00	5.66E+00	-9.19E+01	1.08E+04
	MAX		1.14E+01	3.87E+02	4.34E+00					
2-W19-5	AVE	NN	8.21E+00	1.02E+02	3.59E+00	NN	NN	NN	NN	NN
(216-S-23)*	MIN		5.74E+00	-1.09E+02	2.33E+00					
	MAX	4.87E+04	8.63E+04	3.00E+04	1.51E+03	2.14E+00	0.00E+00	2.97E+01	2.99E+01	1.20E+05
2-W19-11	AVE	2.72E+04	8.63E+04	1.42E+04	6.60E+02	2.14E+00	-3.68E+00	1.18E+01	7.03E+00	1.20E+05
(216-U-1)*	MIN	3.82E+00	8.63E+04	8.87E+02	7.13E+01	2.14E+00	-9.27E+00	1.77E+00	-1.49E+01	1.20E+05
	MAX	4.44E+00	9.30E+00	2.78E+02	7.61E+00		3.51E+00	3.63E+00	5.52E+01	6.50E+00
2-W19-12	AVE	3.51E+00	7.33E+00	1.64E+02	6.07E+00	NN	-4.38E-01	-9.95E-01	2.61E+01	5.24E+00
(241-U)	MIN	2.71E+00	5.09E+00	3.76E+01	2.59E+00		-3.52E+00	-6.09E+00	8.73E+00	3.30E+00
	MAX	2.19E+01	2.58E+01	2.05E+02	2.79E+02	6.49E-01	7.83E+00	9.44E+00	4.66E+01	3.69E+01
2-W19-13	AVE	1.86E+01	1.24E+01	8.85E+01	8.35E+01	1.65E-01	2.06E+00	1.14E+00	1.70E+00	2.58E+01
(216-U-16)	MIN	1.07E+01	3.81E+00	-1.34E+02	1.58E+01	-2.39E-01	-4.13E+00	-5.32E+00	-8.94E+01	1.74E+01
	MAX	5.60E+00	1.89E+01	3.92E+02	1.18E+02	1.60E+00	9.75E+00	6.06E+00	7.96E+01	8.55E+00
2-W19-14	AVE	4.07E+00	8.94E+00	6.92E+01	2.40E+01	5.34E-01	6.39E-01	-2.09E+00	-2.05E+00	5.26E+00
(216-U-16)	MIN	2.13E+00	3.63E+00	-1.36E+02	1.40E+00	-5.03E-03	-6.61E+00	-1.57E+01	-6.61E+01	2.32E+00
	MAX	9.67E+00	6.46E+02	3.99E+04	1.58E+01	3.92E+02	3.20E+00	-1.52E+00	1.86E+01	
2-W22-1	AVE	6.88E+00	2.11E+02	1.06E+04	1.06E+01	1.42E+02	-5.76E-01	-4.49E+00	-1.59E+01	NN
(216-S-1)*	MIN	3.40E+00	2.93E+01	9.14E+02	6.42E+00	1.21E+01	-1.18E+01	-8.30E+00	-7.29E+01	
	MAX	8.87E+00	4.88E+02	3.61E+04	1.78E+01	6.12E+00	6.41E+00	7.11E+00	-1.09E+01	
2-W22-2	AVE	6.87E+00	1.37E+02	1.05E+04	1.18E+01	3.73E+00	7.92E-01	2.53E+00	-4.05E+01	NN
(216-S-1,2)*	MIN	2.97E+00	1.72E+01	1.50E+03	6.29E+00	1.62E+00	-1.60E+00	-1.69E+00	-6.37E+01	
	MAX		1.32E+02	1.43E+06	1.04E+01	5.64E-01				
2-W22-12	AVE	NN	3.52E+01	4.93E+05	6.56E+00	1.51E-01	NN	NN	NN	NN
(216-S-7)*	MIN		6.63E+00	5.73E+04	4.13E+00	-2.62E-01				
	MAX	7.03E+00	5.68E+01	8.89E+05		3.58E-01				
2-W22-20	AVE	7.03E+00	4.70E+01	6.54E+05	NN	1.47E-01	NN	NN	NN	NN
(216-S-20)*	MIN	7.03E+00	3.03E+01	4.75E+05		-1.55E-02				
	MAX	5.24E+01	1.92E+02		1.33E+01	3.59E-01	4.47E+00	9.02E+00	4.38E+01	
2-W22-21	AVE	2.95E+01	1.45E+02	NN	1.03E+01	2.36E-01	-1.36E+00	7.32E-02	1.88E+01	NN
(216-S-13)*	MIN	4.52E+00	4.70E+01		8.41E+00	1.12E-01	-1.04E+01	-1.02E+01	-1.07E+01	

Table B.1. Results of the Unconfined Aquifer Ground-Water Monitoring Network in CY 1985. (sheet 10 of 12)

Well no. (waste site)		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (pCi/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (µg/L)
2-W22-22 (216-U-12)	MAX	1.97E+00	6.33E+00	2.94E+03	3.37E+01	3.21E+00	9.75E+00	6.77E+00	8.03E+01	9.91E+00
	AVE	1.07E+00	4.04E+00	2.11E+03	6.95E+00	3.92E-01	1.92E+00	8.63E-01	-5.52E+00	2.53E+00
	MIN	4.04E-01	1.53E+00	1.58E+03	3.19E-01	-8.50E-01	-3.48E+00	-6.66E+00	-4.18E+01	1.92E-01
2-W22-26 (216-S-9)*	MAX		2.06E+01	3.25E+05		3.39E-01	2.44E+00	3.56E+00	4.14E+01	
	AVE	NN	1.50E+01	1.68E+05	NN	1.53E-01	-2.81E+00	-4.89E+00	-1.74E+00	NN
	MIN		1.25E+01	2.13E+04		-8.42E-02	-9.99E+00	-1.69E+01	-3.49E+01	
2-W23-1 (216-S-3, 241-S)*	MAX		7.93E+01		8.45E+00					
	AVE	NN	2.92E+01	NN	4.32E+00	NN	NN	NN	NN	NN
	MIN		8.16E+00		1.70E+00					
2-W23-2 (241-SX)	MAX		2.47E+01		3.68E+00					
	AVE	NN	1.02E+01	NN	2.60E+00	NN	NN	NN	NN	NN
	MIN		4.35E+00		1.63E+00					
2-W23-3 (241-SX)	MAX		6.72E+00		3.94E+00					
	AVE	NN	5.14E+00	NN	3.34E+00	NN	NN	NN	NN	NN
	MIN		3.72E+00		2.39E+00					
2-W23-9 (216-S-25)	MAX	7.91E+00	5.51E+00	1.59E+05		1.86E+00	3.91E+00	4.75E+00	3.51E+01	
	AVE	3.69E+00	3.84E+00	9.41E+04	NN	4.86E-01	4.28E-01	1.03E+00	1.12E+00	NN
	MIN	1.12E+00	2.62E+00	4.57E+04		-3.03E-01	-3.10E+00	-1.30E+01	-3.57E+01	
2-W23-10 (216-S-25)	MAX		2.91E+01	1.84E+04		3.31E+00	1.07E+01	4.85E+00	9.44E+01	
	AVE	NN	1.08E+01	5.97E+03	NN	8.07E-01	2.10E+00	1.09E+00	-1.53E+00	NN
	MIN		4.81E+00	-6.07E+02		-1.09E-01	-7.84E+00	-9.48E+00	-1.24E+02	
2-W23-11 (216-U-10)*	MAX	2.02E+01	1.59E+02	5.53E+05			3.44E+00	7.09E+00	2.43E+01	2.64E+01
	AVE	1.54E+01	2.64E+01	6.31E+04	NN	NN	1.42E-03	-7.56E-01	-1.78E+01	1.98E+01
	MIN	9.41E+00	3.53E+00	-1.51E+02			-4.47E+00	-7.12E+00	-7.48E+01	7.83E+00
2-W26-3 (216-S-6)*	MAX	3.73E+01	3.00E+01	1.93E+02	1.13E+02					
	AVE	9.49E+00	1.45E+01	1.22E+02	2.42E+01	NN	NN	NN	NN	NN
	MIN	1.10E+00	3.23E+00	7.92E+00	1.85E+00					
2-W26-6 (216-S-5)*	MAX	1.58E+00	4.12E+01	3.72E+02	1.35E+02					
	AVE	1.29E+00	1.31E+01	1.62E+02	3.04E+01	NN	NN	NN	NN	NN
	MIN	8.46E-01	3.84E+00	3.81E+01	2.09E+00					
2-W27-1 (216-S-26)*	MAX	9.11E+00	3.41E+01	6.37E+05	9.56E+01	1.92E+00	8.70E+00	4.83E+00	6.94E+01	1.19E+01
	AVE	7.20E+00	2.22E+01	2.40E+05	4.29E+01	6.51E-01	4.97E+00	-9.30E-01	3.61E+01	9.42E+00
	MIN	5.01E+00	1.54E+01	9.80E+04	2.33E+01	-9.44E-02	2.56E+00	-9.13E+00	1.35E+01	5.58E+00

Table B.1. Results of the Unconfined Aquifer Ground-Water Monitoring Network in CY 1985. (sheet 11 of 12)

Well no. (waste site)		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (pCi/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (µg/L)
6-32-72	MAX	2.19E+00	1.06E+01					8.40E-01		
(216-S-19)*	AVE	6.01E-01	7.24E+00	NN	NN	NN	NN	8.40E-01	NN	NN
	MIN	-2.49E-02	3.31E+00					8.40E-01		
6-35-78A	MAX	1.06E+01	8.29E+00	8.75E+02	1.34E+00		6.54E+00	4.86E+00	5.83E+01	1.55E+01
(216-U-10)*	AVE	6.84E+00	4.69E+00	1.65E+02	9.28E-01	NN	9.05E-01	8.52E-01	6.60E+00	1.06E+01
	MIN	1.32E+00	2.55E+00	-1.99E+02	4.00E-01		-5.43E+00	-6.65E+00	-5.36E+01	4.56E+00
6-42-40A	MAX	2.12E+00	5.92E+00	1.32E+04	1.70E+01	1.77E+00	5.11E+00	7.91E+00	2.32E+01	2.23E+00
(216-B-3)	AVE	9.07E-01	4.20E+00	2.53E+03	5.64E+00	3.62E-01	-1.00E+00	2.39E+00	-7.09E+00	9.86E-01
	MIN	4.90E-02	1.18E+00	2.73E+02	6.42E-01	-5.91E-01	-1.78E+01	-7.85E+00	-6.46E+01	-3.98E-01
6-42-40B	MAX		4.25E+00	6.46E+01		3.97E-01	-7.12E-01	0.00E+00	-8.98E+00	
(216-B-3)	AVE	NN	4.25E+00	6.46E+01	NN	3.97E-01	-7.12E-01	0.00E+00	-8.98E+00	NN
	MIN		4.25E+00	6.46E+01		3.97E-01	-7.12E-01	0.00E+00	-8.98E+00	
6-50-42	MAX	1.47E+00	6.86E+00			3.81E-01				
(216-A-25)	AVE	1.03E+00	5.48E+00	NN	NN	1.72E-01	NN	NN	NN	NN
	MIN	5.91E-01	4.09E+00			6.41E-02				
6-53-47A	MAX	3.03E+00	1.61E+02			8.24E+01	5.11E+00	3.04E+00	2.67E+01	
(216-A-25)	AVE	1.42E+00	1.19E+02	NN	NN	6.28E+01	1.27E+00	7.17E-02	-1.06E+01	NN
	MIN	1.97E-01	7.38E+01			3.64E+01	-2.88E+00	-5.57E+00	-6.54E+01	
6-53-47B	MAX	2.71E+00	1.67E+02			7.84E+01	2.49E+00	7.09E+00	3.28E+01	
(216-A-25)	AVE	2.01E+00	1.32E+02	NN	NN	6.95E+01	-5.44E-01	1.02E+00	-7.90E+00	NN
	MIN	1.05E+00	1.09E+02			6.27E+01	-4.63E+00	-5.65E+00	-7.68E+01	
6-53-48A	MAX	1.40E+01	1.14E+01			6.50E+01	6.88E+00	3.38E+00	7.03E+01	1.33E+01
(216-A-25)	AVE	6.40E+00	8.68E+00	NN	NN	7.52E+00	-3.26E-01	-1.36E+00	3.12E+00	1.33E+01
	MIN	4.19E-01	6.41E+00			3.64E-02	-6.39E+00	-1.69E+01	-5.35E+01	1.33E+01
6-53-48B	MAX	2.20E+00	1.37E+03			8.98E+02	4.99E+00	6.04E+00	7.73E+01	
(216-A-25)	AVE	5.14E-01	8.05E+02	NN	NN	5.29E+02	-1.38E-01	8.62E-02	1.07E+01	NN
	MIN	8.86E-02	7.84E+00			3.40E+02	-1.01E+01	-8.28E+00	-3.25E+01	
6-53-55A	MAX	1.47E+00	4.82E+01			8.87E-01	5.16E+00	5.66E+00	7.03E+01	
(216-A-25)	AVE	7.58E-01	1.50E+01	NN	NN	1.16E-01	3.29E-01	2.49E+00	9.22E-01	NN
	MIN	4.23E-01	7.64E+00			-4.33E-01	-5.34E+00	-5.65E+00	-6.74E+01	
6-54-48	MAX	1.91E+00	4.04E+01		1.97E+00	2.90E+01	4.48E+00	9.70E+00	9.40E+01	
(216-A-25)	AVE	1.08E+00	2.58E+01	NN	1.97E+00	1.32E+01	-3.13E+00	-5.13E-01	1.79E+01	NN
	MIN	4.68E-01	1.54E+01		1.97E+00	6.77E+00	-1.01E+01	-7.88E+00	-2.06E+01	

Table B.1. Results of the Unconfined Aquifer Ground-Water Monitoring Network in CY 1985. (sheet 12 of 12)

Well no. (waste site)		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (pCi/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (µg/L)
	MAX	1.78E+00	7.52E+01			2.86E+01	1.73E+00	-1.74E+00	0.00E+00	
6-54-49	AVE	1.06E+00	3.52E+01	NN	NN	1.61E+01	3.30E-01	-6.42E+00	-2.39E+01	NN
(216-A-25)	MIN	4.41E-01	1.46E+01			6.57E+00	-1.07E+00	-1.11E+01	-4.78E+01	
	MAX	1.32E+00	6.89E+00			1.43E+00				
6-55-50C	AVE	9.23E-01	5.09E+00	NN	NN	5.89E-01	NN	NN	NN	NN
(216-A-25)	MIN	5.00E-01	3.32E+00			1.92E-01				
	MAX	1.87E+00	7.51E+00			1.16E+00				
6-55-50D	AVE	1.87E+00	7.51E+00	NN	NN	1.16E+00	NN	NN	NN	NN
(216-A-25)	MIN	1.87E+00	7.51E+00			1.16E+00				
	MAX	1.13E+00	4.10E+00	1.37E+02	3.98E+00	9.83E-01				
6-56-51	AVE	6.96E-01	3.52E+00	1.37E+02	3.98E+00	4.40E-01	NN	NN	NN	NN
(216-A-25)	MIN	4.23E-01	2.85E+00	1.37E+02	3.98E+00	1.97E-01				
	MAX	1.12E+00	4.65E+00			1.78E+00				
6-59-58	AVE	1.12E+00	4.65E+00	NN	NN	5.79E-01	NN	NN	NN	NN
(216-A-25)	MIN	1.12E+00	4.65E+00			-1.90E-01				
	MAX	1.17E+00	4.12E+00			6.88E-01				
6-63-58	AVE	9.91E-01	4.05E+00	NN	NN	4.21E-01	NN	NN	NN	NN
(216-A-25)	MIN	8.12E-01	3.99E+00			1.47E-01				

*Inactive crib.
**Analyses not necessary (as determined from inventory, effluent history, or gross alpha/beta analyses).

APPENDIX B.2

RESULTS OF THE CONFINED AQUIFER GROUND-WATER MONITORING NETWORK IN CY 1985

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Table B.2. Results of the Confined Aquifer Ground-Water Monitoring Network in CY 1985.

Well no. (waste site)		Alpha (pCi/L)	Beta (pCi/L)	Tritium (pCi/L)	Nitrate (pCi/L)	^{90}Sr (pCi/L)	^{137}Cs (pCi/L)	^{60}Co (pCi/L)	^{106}Ru (pCi/L)	Uranium (µg/L)
2-E26-8	MAX			9.69E+01	8.28E+00					
	AVE	NN*	NN	5.65E+01	4.38E+00	NN	NN	NN	NN	NN
	MIN			1.61E+01	4.78E-01					
2-E33-12	MAX			4.19E+02	2.41E+00					
	AVE	NN	NN	4.19E+02	1.62E+00	NN	NN	NN	NN	NN
	MIN			4.19E+02	8.30E-01					
6-47-50	MAX			6.31E+03	2.76E+00					
	AVE	NN	NN	3.15E+03	1.68E+00	NN	NN	NN	NN	NN
	MIN			-1.50E+01	5.98E-01					
6-49-55B	MAX			-2.69E+02	2.16E+00					
	AVE	NN	NN	-2.69E+02	2.16E+00	NN	NN	NN	NN	NN
	MIN			-2.69E+02	2.16E+00					
6-50-45	MAX			-5.34E+01	1.59E+00					
	AVE	NN	NN	-5.34E+01	1.59E+00	NN	NN	NN	NN	NN
	MIN			-5.34E+01	1.59E+00					
6-50-48B	MAX			-1.46E+01	1.27E+00					
	AVE	NN	NN	-1.46E+01	1.27E+00	NN	NN	NN	NN	NN
	MIN			-1.46E+01	1.27E+00					
6-51-46	MAX			7.19E+01	1.05E+00					
	AVE	NN	NN	7.19E+01	1.05E+00	NN	NN	NN	NN	NN
	MIN			7.19E+01	1.05E+00					
6-53-50	MAX			2.72E+02	1.23E+00					
	AVE	NN	NN	5.80E+01	8.54E-01	NN	NN	NN	NN	NN
	MIN			-1.56E+02	4.78E-01					
6-54-57	MAX			1.35E+01	8.85E-01					
	AVE	NN	NN	1.35E+01	8.85E-01	NN	NN	NN	NN	NN
	MIN			1.35E+01	8.85E-01					

*Analyses not necessary (as determined from inventory, effluent history, or gross alpha/beta analyses).

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APPENDIX C

SEPARATIONS AREA CONFINED AND UNCONFINED AQUIFER GROUND-WATER MONITORING SCHEDULES FOR CY 1986

CONTENTS

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Table C.1. Separations Area Unconfined Aquifer Ground-Water Monitoring Schedule for CY 1986. (sheet 1 of 6)

Well	EMA[a] No.	Site monitored	Sample method	Total alpha	Total beta	^{90}Sr	^{137}Cs	^{106}Ru	^{60}Co	^{3}H	NO_3	U
299-E13-5	2314	216-B-18	P[b]	--[c]	Q[d]	--	--	--	--	Q	--	--
299-E13-8	2334	216-B-21	P	--	Q	--	Q	Q	Q	--	--	--
299-E13-14	2340	216-B-29	P	--	Q	--	--	--	--	--	--	--
299-E13-19	2352	216-B-28	P	--	Q	--	--	--	--	--	--	--
299-E16-2	2372	216-A-30	B[e]	M[f]	M	M	M	M	M	M	M	--
299-E17-1	2328	216-A-10	P	M	M	M	M	M	M	M	M	--
299-E17-2	2367	216-A-27	B	M	M	Q	Q	Q	Q	M	M	--
299-E17-5	2511	216-A-36B	P	M	M	M	M	M	M	M	M	M
299-E17-6	2512	200 East	P	--	M	--	--	--	--	Q	Q	--
299-E17-8	2513	216-A-38	P	--	M	Q	Q	Q	Q	M	M	--
299-E17-9	2514	216-A-36B	P	M	M	M	M	M	M	M	M	--
299-E23-2	2376	200 East	B	--	Q	--	--	--	--	Q	Q	--
299-E24-1	2317	216-A-5	B	--	M	Q	Q	Q	Q	M	M	--
299-E24-2	2326	216-A-10	P	M	M	M	M	M	M	M	M	--
299-E24-4	2329	216-A-9	B	--	M	Q	Q	Q	Q	M	M	--
299-E24-8	2355	216-C-3, -4, -5	P	--	M	--	M	M	M	M	M	--
299-E24-12	2521	216-A-21, -31	P	--	M	Q	Q	Q	Q	M	M	--
299-E24-13	2383	241-A	B	--	Q	--	--	--	--	--	Q	--
299-E25-2	2316	216-A-1, -7	B	--	S[g]	--	--	--	--	S	S	--
299-E25-3	2318	216-A-6	B	--	Q	--	--	--	--	--	--	--
299-E25-6	2343	216-A-8	B	M	M	M	M	M	M	M	Q	--
299-E25-9	2344	216-A-8	B	M	M	M	M	M	M	M	Q	--
299-E25-10	2363	216-A-18, -19, -20	P	Q	Q	--	Q	Q	Q	--	--	Q
299-E25-11	2370	216-A-30	B	M	M	M	M	M	M	M	M	--
299-E25-13	2523	241-AX	B	--	Q	--	--	--	--	--	Q	--
299-E25-17	2386	216-A-37-1	B	M	M	Q	Q	Q	Q	M	M	--
299-E25-18	2387	216-A-37-1	P	M	M	Q	Q	Q	Q	M	M	--
299-E-25-19	2388	216-A-37-1	B	M	M	Q	Q	Q	Q	M	M	--

Table C.1. Separations Area Unconfined Aquifer Ground-Water Monitoring Schedule for CY 1986. (sheet 2 of 6)

Well	EMA No.	Site monitored	Sample method	Total alpha	Total beta	^{90}Sr	^{137}Cs	^{106}Ru	^{60}Co	^{3}H	NO_3	U
299-E25-20	2389	216-A-37-1	P	M	M	Q	Q	Q	Q	M	M	--
299-E25-21	2391	216-A-37-2	P	M	M	M	M	M	M	M	M	--
299-E25-22	2392	216-A-37-2	P	M	M	M	M	M	M	M	M	--
299-E25-23	2393	216-A-37-2	P	M	M	M	M	M	M	M	M	--
299-E25-24	2394	216-A-37-2	P	M	M	M	M	M	M	M	M	--
299-E26-2	2364	216-A-24	B	--	Q	--	--	--	--	Q	Q	--
299-E26-4	2362	216-A-24	B	--	Q	--	--	--	--	Q	Q	--
299-E26-6	2369	401-A Cooling	P	Q	Q	Q	Q	Q	Q	Q	Q	--
299-E27-5	2551	216-C-10	P	--	Q	--	Q	Q	Q	--	--	--
299-E27-7	2557	241-C	P	Q	Q	--	--	--	--	--	Q	--
299-E28-9	2357	216-B-12	B	Q	Q	--	--	--	--	--	--	Q
299-E28-12	2380	216-B-55	B	--	M	--	M	M	M	M	--	--
299-E28-13	2324	216-B-55	P	--	M	--	M	M	M	M	--	--
299-E28-16	2325	216-B-12	P	Q	Q	--	--	--	--	--	--	Q
299-E28-17	2519	216-B-6-10B	B	Q	--	--	--	--	--	--	--	--
299-E28-18	2524	216-B-62	P	M	M	M	M	M	M	M	M	M
299-E28-21	2556	216-B-62	P	M	M	M	M	M	M	M	M	M
299-E28-23	2390	216-B-5	B	Q	Q	Q	Q	Q	Q	Q	Q	--
299-E32-1	2358	200 East	P	--	S	--	--	--	--	S	S	--
299-E33-1	2301	216-B-43	P	--	Q	Q	Q	Q	Q	--	--	--
299-E33-3	2303	216-B-44, -45, -46	P	--	Q	Q	Q	Q	Q	Q	--	--
299-E33-5	2308	216-B-47	P	--	Q	Q	Q	Q	Q	--	--	--
299-E33-7	2305	216-B-48, -49, -50	P	--	Q	Q	Q	Q	Q	--	--	--
299-E33-8	2300	216-B-41	P	--	Q	Q	Q	Q	Q		--	--
299-E33-9	2299	241-BY	B	--	Q	Q	Q	Q	Q	Q	Q	--
299-E33-10	2306	216-B-35, -41	P	--	Q	Q	Q	Q	Q	Q	Q	--
299-E33-18	2309	216-B-7A, -7B	P	--	Q	Q	Q	Q	Q	--	--	--
299-E33-20	2332	216-B-7A, -7B, -11A, -11B	B	--	Q	Q	--	--	--	--	Q	--

Table C.1. Separations Area Unconfined Aquifer Ground-Water Monitoring Schedule for CY 1986. (sheet 3 of 6)

Well	EMA No.	Site monitored	Sample method	Total alpha	Total beta	^{90}Sr	^{137}Cs	^{106}Ru	^{60}Co	^{3}H	NO_3	U
299-E33-21	2353	216-B-36	P	--	Q	--	Q	Q	Q	--	--	--
299-E33-24	2520	216-B-57	P	--	Q	Q	Q	Q	Q	--	--	--
299-E33-26	2382	216-B-61	P	--	Q	Q	Q	Q	Q	--	--	--
299-E33-27	2527	241-BX	B	--	Q	Q	Q	Q	Q	Q	Q	--
299-E34-1	2374	216-B-63	P	M	M	--	M	M	M	M	--	--
299-W10-1	2892	216-T-5	B	--	Q	Q	Q	Q	Q	--	--	--
299-W10-3	2885	216-T-32	B	Q	Q	Q	Q	Q	Q	--	--	--
299-W10-4	2886	216-T-36	P	--	Q	Q	Q	Q	Q	--	--	--
299-W10-8	2996	241-T	P	Q	Q	Q	Q	Q	Q	--	Q	--
299-W10-9	3009	241-T	P	Q	Q	Q	Q	Q	Q	--	Q	--
299-W11-11	2887	216-T-18	P	Q	Q	Q	Q	Q	Q	--		--
299-W11-13	2942	200 West	B	--	S	--	--	--	--	S	S	--
299-W11-15	2961	216-T-32	P	--	Q	--	--	--	--	--	--	--
299-W11-18	2963	216-T-35	P	--	Q	Q	Q	Q	Q	--	--	--
299-W11-23	2616	241-T	P	Q	Q	Q	Q	Q	Q	--	Q	--
299-W11-24	3010	241-T	P	Q	Q	Q	Q	Q	Q	--	Q	--
299-W14-2	2895	216-T-26, -27, -28	P	Q	Q	Q	Q	Q	Q	Q	--	--
299-W14-5	3007	241-TX	P	--	Q	--	--	--	--	Q	Q	--
299-W14-6	3008	241-TX	P	--	Q	--	--	--	--	Q	Q	--
299-W14-10	3018	216-W-LWC	P	M	M	M	M	M	M	M	M	--
299-W15-3	2894	241-TY	B	--	Q	Q	Q	Q	Q	--	Q	--
299-W15-4	2896	216-T-19	P	--	Q	--	--	--	--	Q	Q	--
299-W15-6	2934	216-Z-9	B	Q	Q	--	--	--	--	--	Q	--
299-W15-7	2960	216-Z-7	P	Q	Q	Q	Q	Q	Q	--	Q	--
299-W15-10	2609	216-Z-16	P	Q	Q	--	--	--	--	--	Q	--
299-W15-11	2610	216-Z-16	P	Q	Q	Q	Q	Q	Q	--	Q	--

Table C.1. Separations Area Unconfined Aquifer Ground-Water Monitoring Schedule for CY 1986. (sheet 4 of 6)

Well	EMA No.	Site monitored	Sample Method	Total alpha	Total beta	^{90}Sr	^{137}Cs	^{106}Ru	^{60}Co	^{3}H	NO_3	U
299-W18-5	2933	216-Z-12	P	Q	Q	--	--	--	--	--	--	--
299-W18-9	2965	216-Z-18	B	Q	Q	--	--	--	--	--	Q	--
299-W18-12	2967	216-Z-18	P	M	M	Q	Q	Q	Q	Q	Q	Q
299-W18-15	3015	216-U-10	P	M	M	--	M	M	M	M	M	M
299-W18-17	3016	216-Z-20	B	Q	Q	--	Q	Q	Q	Q	Q	--
299-W18-18	3017	216-Z-20	P	M	M	--	M	M	M	M	M	--
299-W18-19	3019	216-Z-20	P	M	M	--	M	M	M	M	M	--
299-W18-20	3020	216-Z-20	B	Q	Q	--	Q	Q	Q	Q	Q	--
299-W19-2	2928	216-U-8	P	Q	Q	Q	Q	Q	Q	Q	Q	Q
299-W19-3	2929	216-U-1, -2	P	Q	Q	--	Q	Q	Q	Q	Q	Q
299-W19-5	2968	216-S-23	P	--	Q	--	--	--	--	Q	Q	--
299-W19-9	2624	216-U-1/2	P	M	M	S	M	M	M	Q	M	M
299-W19-11	2619	216-U-1	P	Q	--	--	Q	Q	Q	Q	Q	--
299-W19-12	2618	241-U	P	Q	Q	Q	Q	Q	Q	Q	Q	Q
299-W19-13	2622	216-U-16	P	M	M	M	M	M	M	M	M	M
299-W19-14	2623	216-U-16	P	M	M	M	M	M	M	M	M	M
299-W19-15	2625	216-U-1/2	P	M	M	S	M	M	M	Q	M	M
299-W19-16	2626	216-U-1/2	P	M	M	S	M	M	M	Q	M	M
299-W19-17	2627	216-U-1/2	P	M	M	S	M	M	M	Q	M	M
299-W19-18	2628	216-U-1/2	P	M	M	S	M	M	M	Q	M	M

Table C.1. Separations Area Unconfined Aquifer Ground-Water Monitoring Schedule for CY 1986. (sheet 5 of 6)

Well	EMA No.	Site monitored	Sample Method	Total alpha	Total beta	^{90}Sr	^{137}Cs	^{106}Ru	^{60}Co	^{3}H	NO_3	U
299-W22-1	2919	216-S-1	P	Q	Q	Q	Q	Q	Q	Q	Q	--
299-W22-2	2920	216-S-1, -2	P	Q	Q	Q	Q	Q	Q	Q	Q	--
299-W22-12	2912	216-S-7	P	--	Q	Q	Q	Q	Q	Q	Q	--
299-W22-20	2926	216-S-20	P	--	Q	Q	Q	Q	Q	Q	--	--
299-W22-21	2931	216-S-13	P	Q	Q	Q	Q	Q	Q	--	Q	--
299-W22-22	2939	216-U-12	P	M	M	M	M	M	M	M	M	M
299-W22-26	2954	216-S-9	P	--	Q	Q	Q	Q	Q	Q	--	--
299-W23-1	2898	216-S-3; 241-S	B	--	Q	Q	Q	Q	Q	--	Q	--
299-W23-2	2910	241-SX	B	--	Q	Q	Q	Q	Q	--	Q	--
299-W23-3	2911	241-SX	B	--	Q	Q	Q	Q	Q	--	Q	--
299-W23-9	2993	216-S-25	B	M	M	M	M	M	M	M	--	--
299-W23-10	2994	216-S-25	P	--	M	M	M	M	M	M	--	--
299-W23-11	2995	216-U-10	P	M	M	--	M	M	M	M	--	M
299-W26-3	2917	216-S-6	P	Q	Q	--	--	--	--	Q	Q	--
299-W26-6	2520	216-S-5	P	Q	Q	Q	Q	Q	Q	Q	Q	--
299-W27-1	2621	216-S-26	P	M	M	Q	Q	Q	Q	Q	Q	Q
699-32-72	6868	216-S-19	P	M	M	--	--	--	--	--	--	--
699-35-78A	4869	216-U-10	P	M	M	--	M	M	M	M	Q	M
699-42-40A	4874	216-B-3	B	M	M	M	M	M	M	M	Q	Q
699-42-40B	4875	216-B-3	P	--	M	M	M	M	M	M	Q	--

Table C.1. Separations Area Unconfined Aquifer Ground-Water Monitoring Schedule for CY 1986. (sheet 6 of 6)

Well	EMA No.	Site monitored	Sample Method	Total alpha	Total beta	^{90}Sr	^{137}Cs	^{106}Ru	^{60}Co	^{3}H	NO_3	U
699-50-42	4460	216-A-25	P	S	S	Q	--	--	--	--	--	--
699-53-47A	4866	216-A-25	P	M	M	M	M	M	M	--	--	--
699-53-47B	4600	216-A-25	P	M	M	M	M	M	M	--	--	--
699-53-48A	4893	216-A-25	P	M	M	M	M	M	M	--	--	--
699-53-48B	4894	216-A-25	P	M	M	M	M	M	M	--	--	--
699-54-48	4895	216-A-25	P	M	M	M	M	M	M	--	--	--
699-54-49	4732	216-A-25	P	M	M	M	--	--	--	--	--	--
699-53-55A	4867	216-A-25	P	M	M	M	M	M	M	--	--	--
699-55-50C	4483	216-A-25	P	Q	Q	M	--	--	--	--	--	--
699-55-50D	4730	216-A-25	B	Q	Q	Q	--	--	--	--	--	--
699-56-51	4733	216-A-25	P	M	M	M	--	--	--	--	--	--
699-59-58	4827	216-A-25	P	S	S	Q	--	--	--	--	--	--
699-63-58	4822	216-A-25	P	S	S	Q	--	--	--	--	--	--

[a]Identification number used in PNL data base.
[b]Pump.
[c]Analyses not necessary (as determined from inventory, effluent history, or gross alpha/beta analyses).
[d]Quarterly.
[e]Bailer.
[f]Monthly.
[g]Semiannually.

Table C.2. Separations Area Confined Aquifer Monitoring Schedule for CY 1986.

Well	EMA[a] No.	Site monitored	Sample method	^3H	NO_3
299-E26-8	2395	Rattlesnake Ridge	Bailer	S[b]	S
299-E33-12	2294	Rattlesnake Ridge	Bailer	S	S
699-42-40C	4881	Rattlesnake Ridge	Bailer	S	S
699-47-50	4882	Rattlesnake Ridge	Bailer	S	S
699-49-55B	4743	Rattlesnake Ridge	Bailer	S	S
699-50-45	4759	Rattlesnake Ridge	Bailer	S	S
699-50-48	4883	Rattlesnake Ridge	Bailer	S	S
699-51-46	4884	Rattlesnake Ridge	Bailer	S	S
699-52-46A	4885	Rattlesnake Ridge	Bailer	S	S
699-52-48	4886	Rattlesnake Ridge	Bailer	S	S
699-53-50	4849	Rattlesnake Ridge	Bailer	S	S
699-54-57	4469	Rattlesnake Ridge	Bailer	S	S
699-56-53	4892	Rattlesnake Ridge	Bailer	S	S

[a]Identification number used in PNL data base.

[b]Semiannually.

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APPENDIX D

LONG-TERM CONCENTRATION HISTORIES OF SELECTED LIQUID WASTE DISPOSAL SITES AND MONITORING WELLS

CONTENTS

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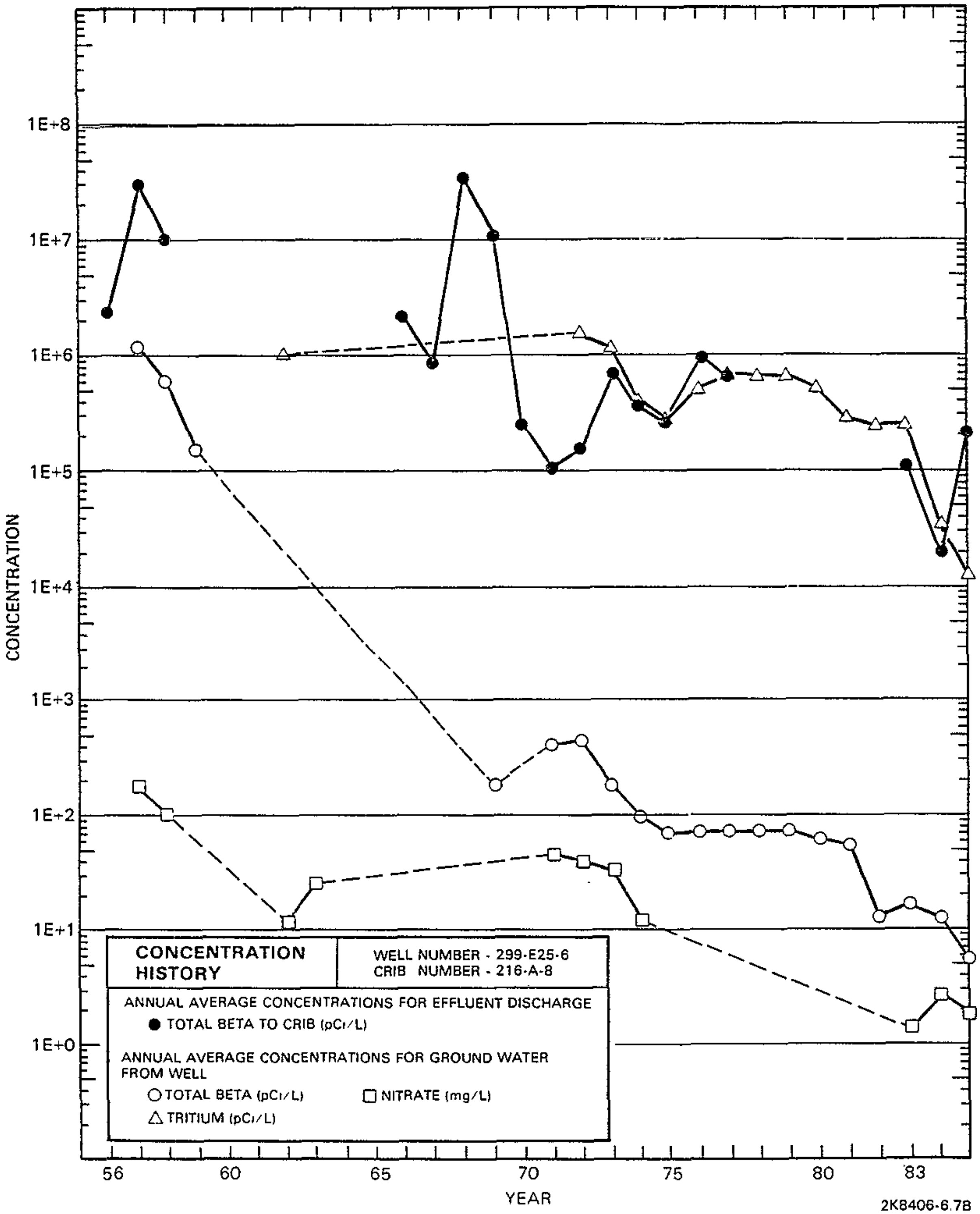

Well 299-E25-6, Crib 216-A-8.

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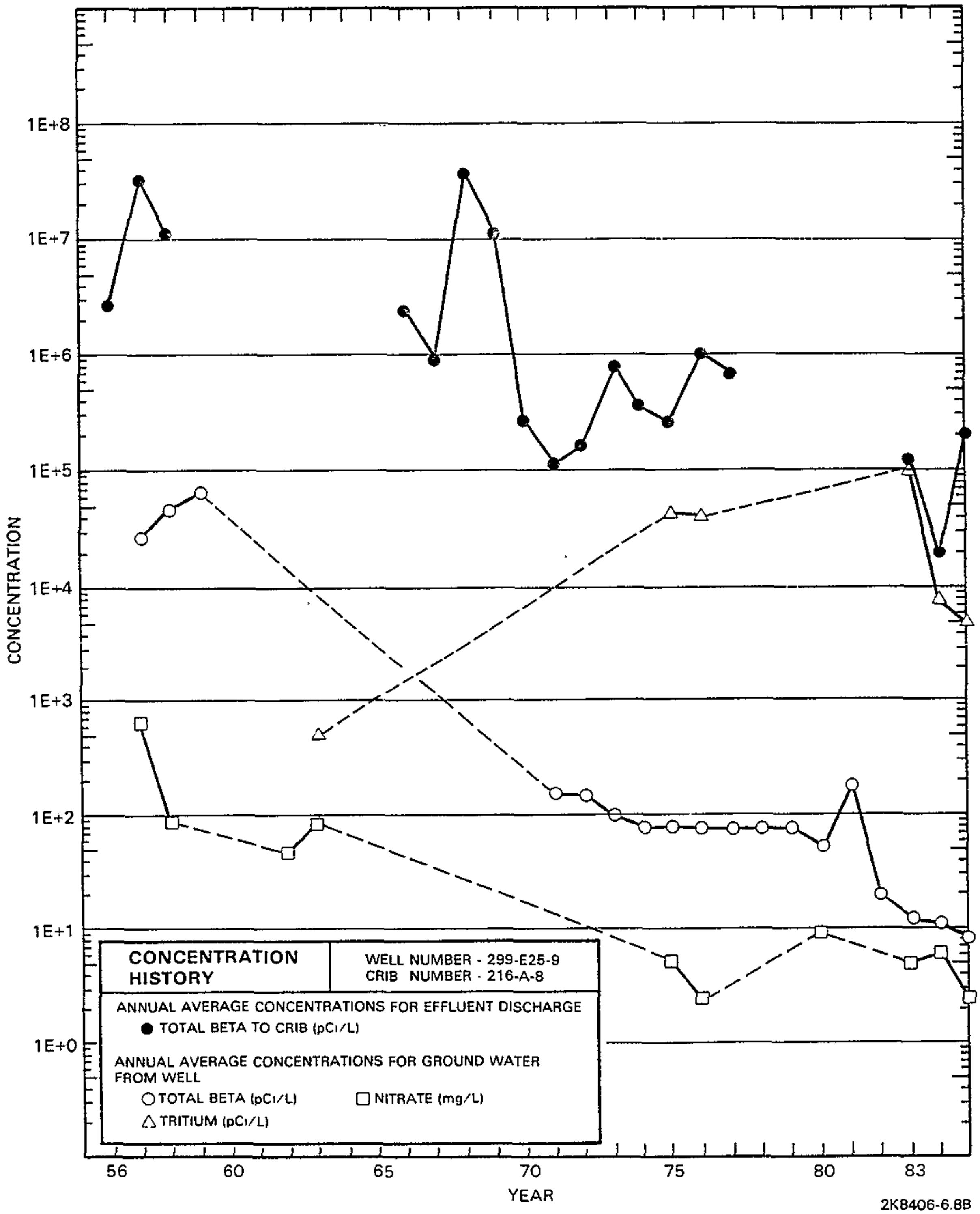

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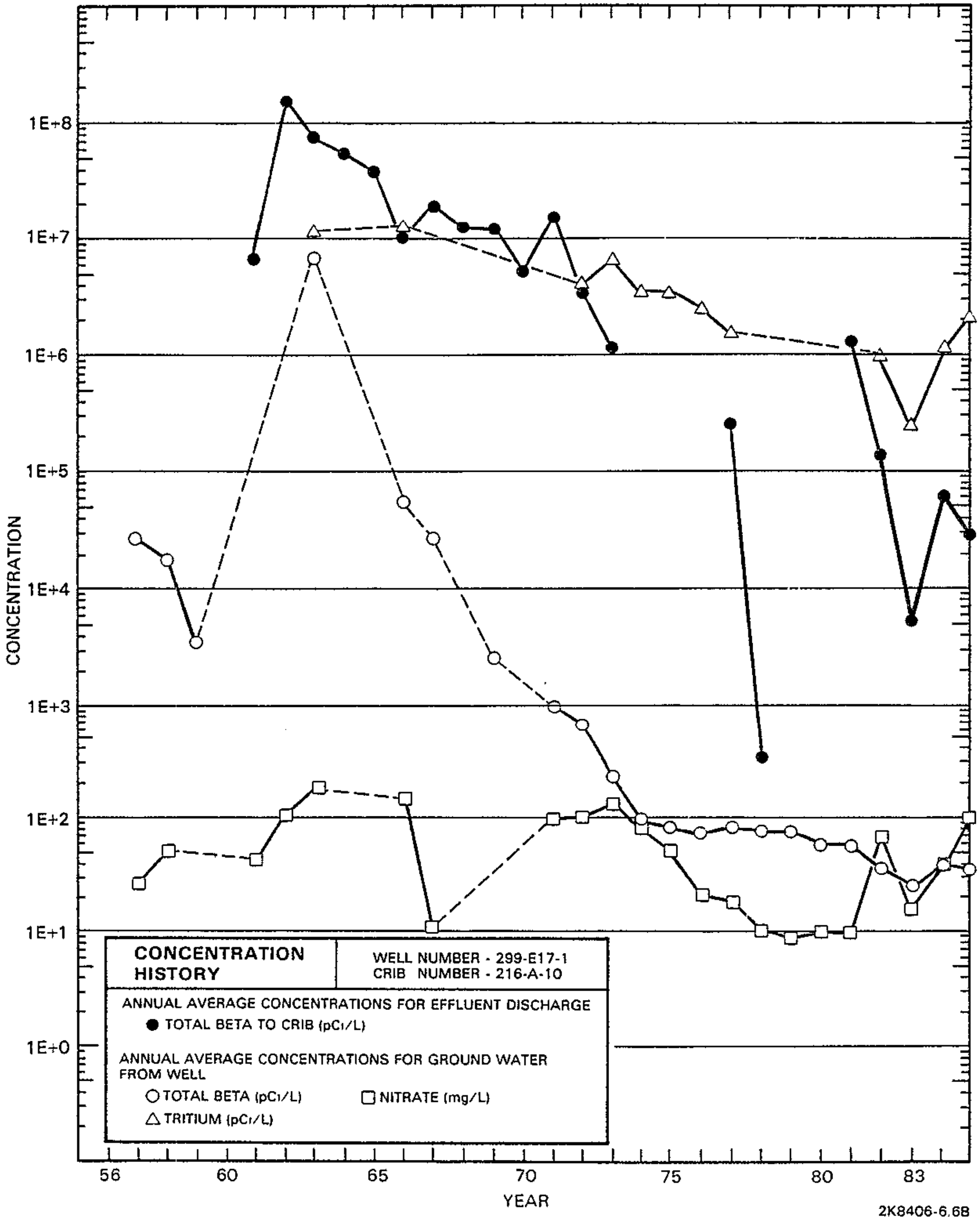
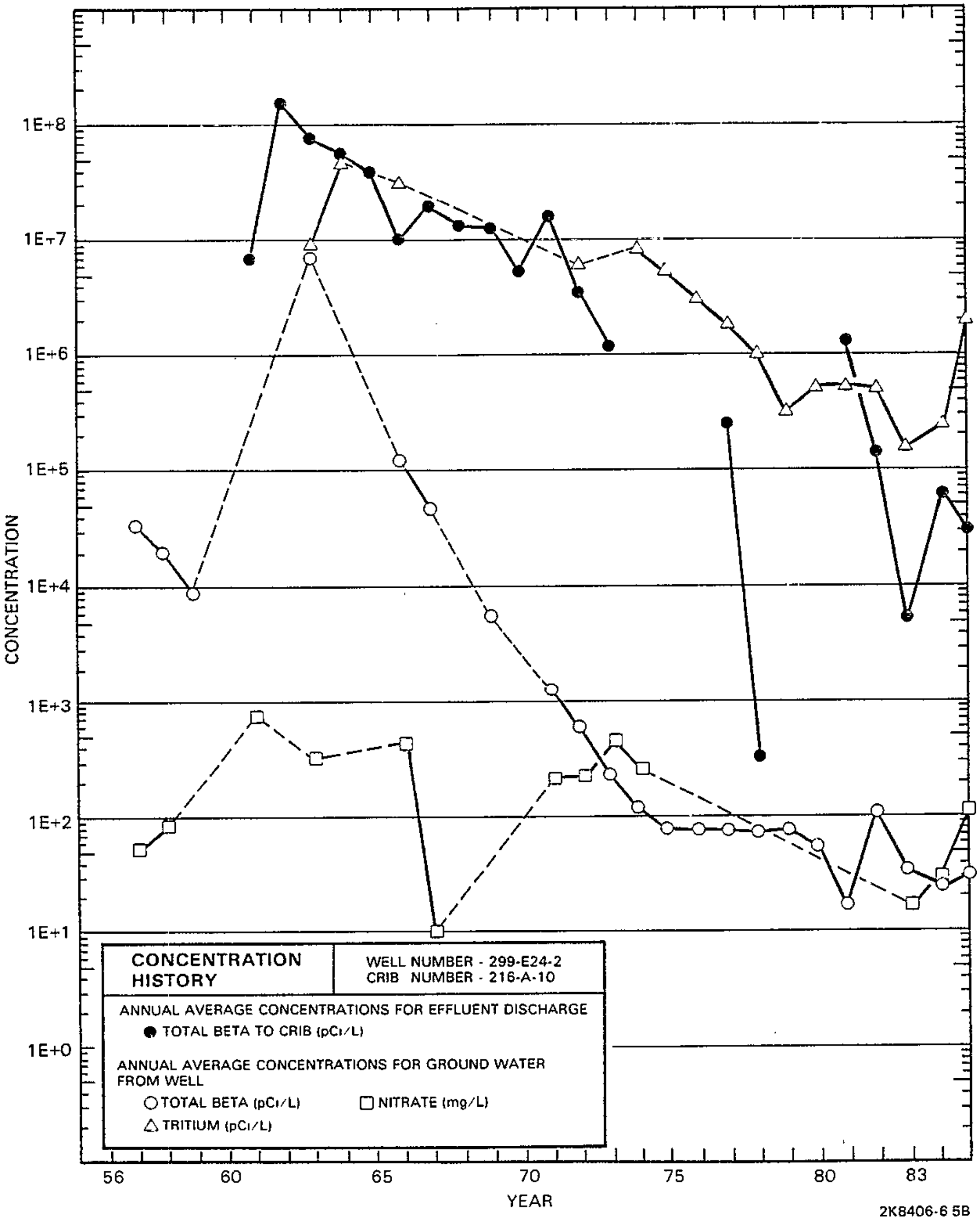


Well 299-E17-1, Crib 216-A-10.



Well 299-E24-2, Crib 216-A-10.

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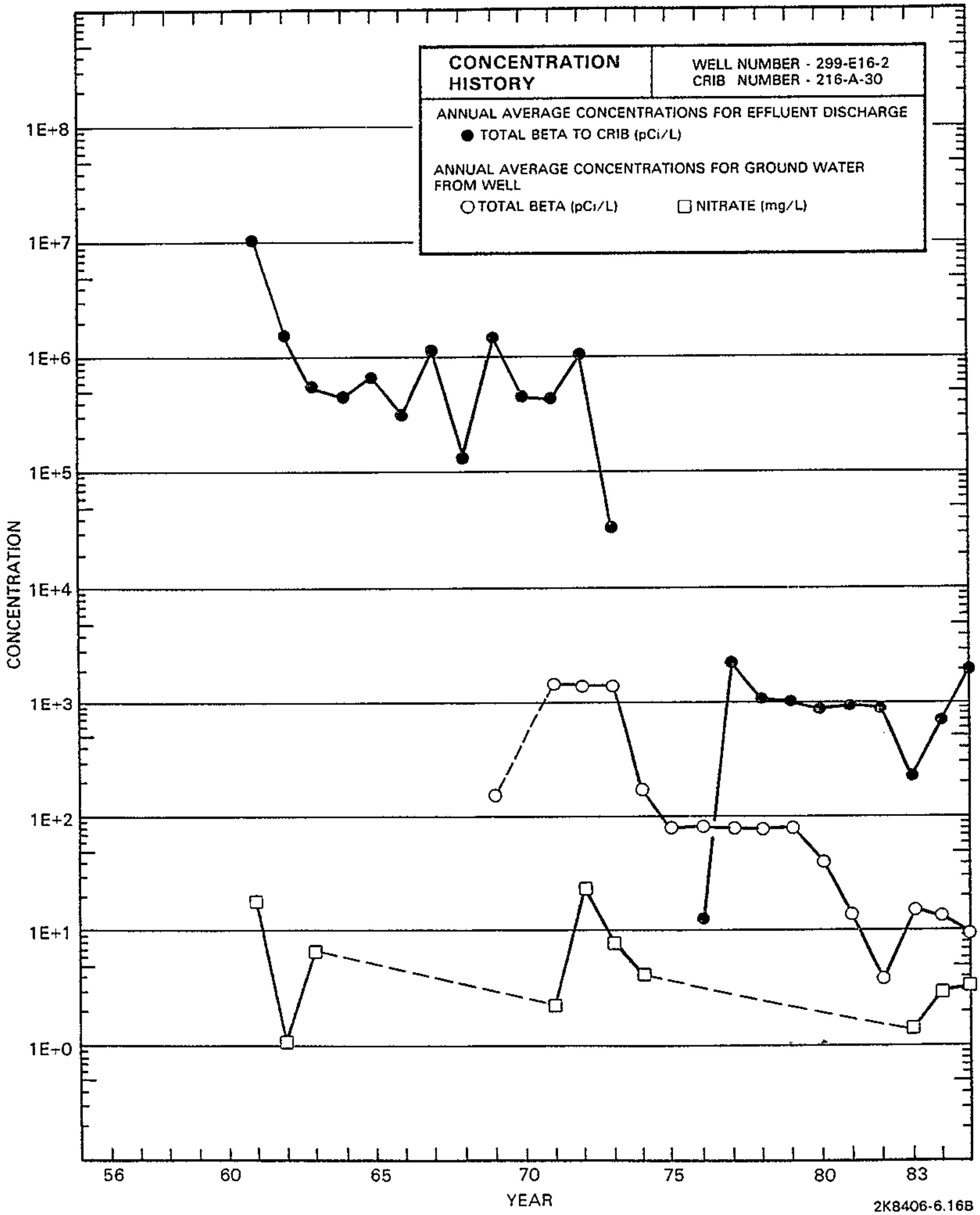

Well 299-E16-2, Crib 216-A-30.

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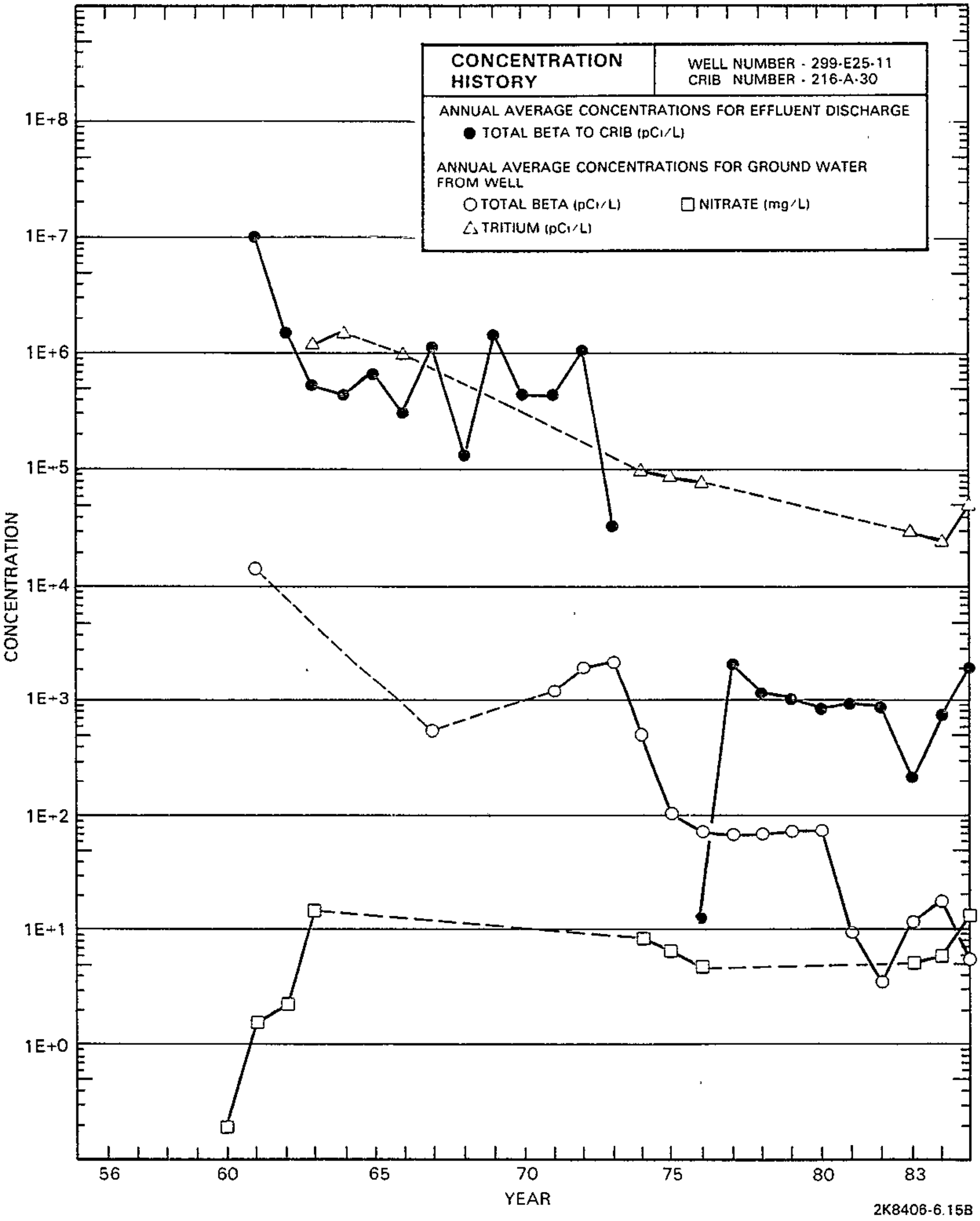

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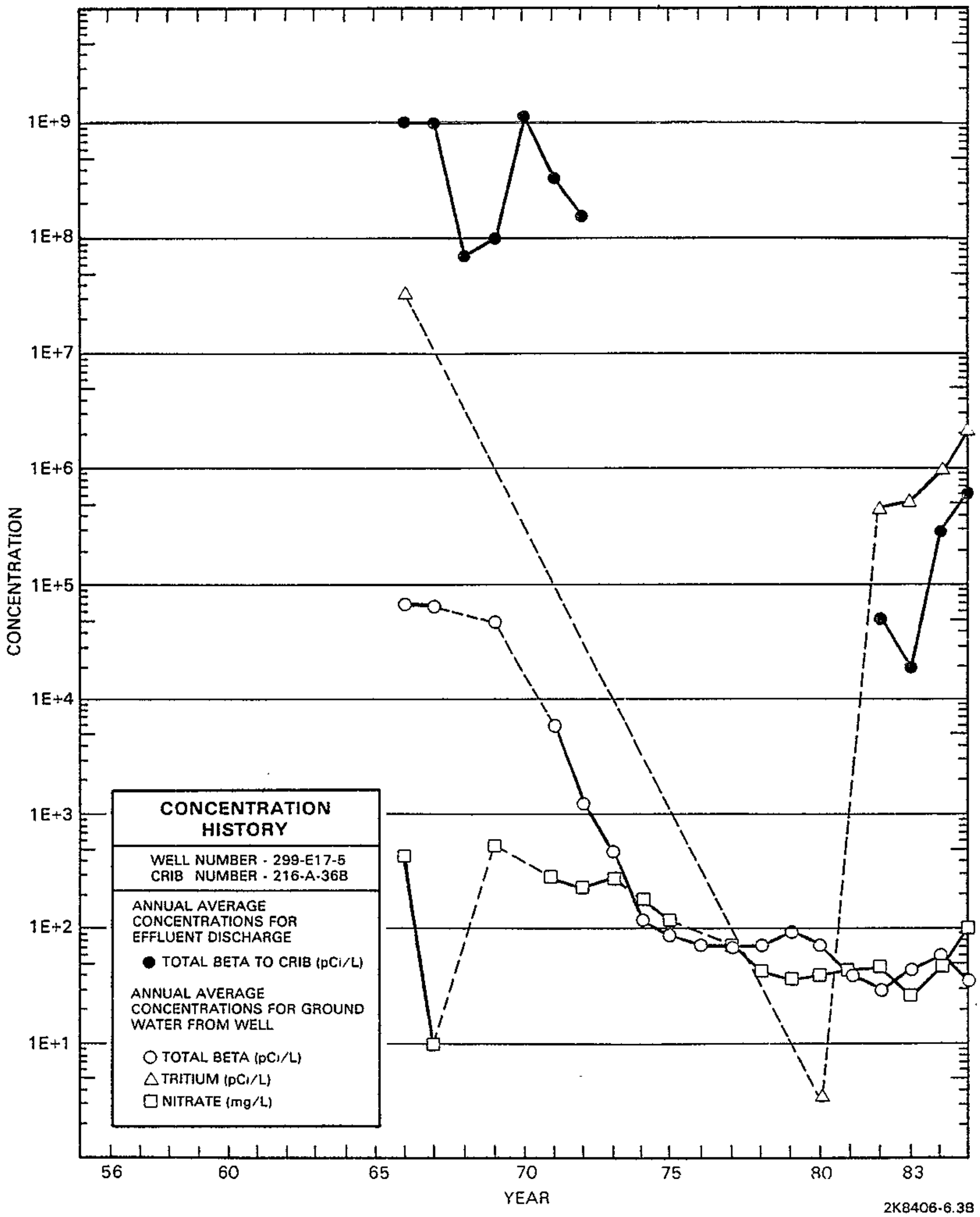

Well 299-E17-5, Crib 216-A-36B.

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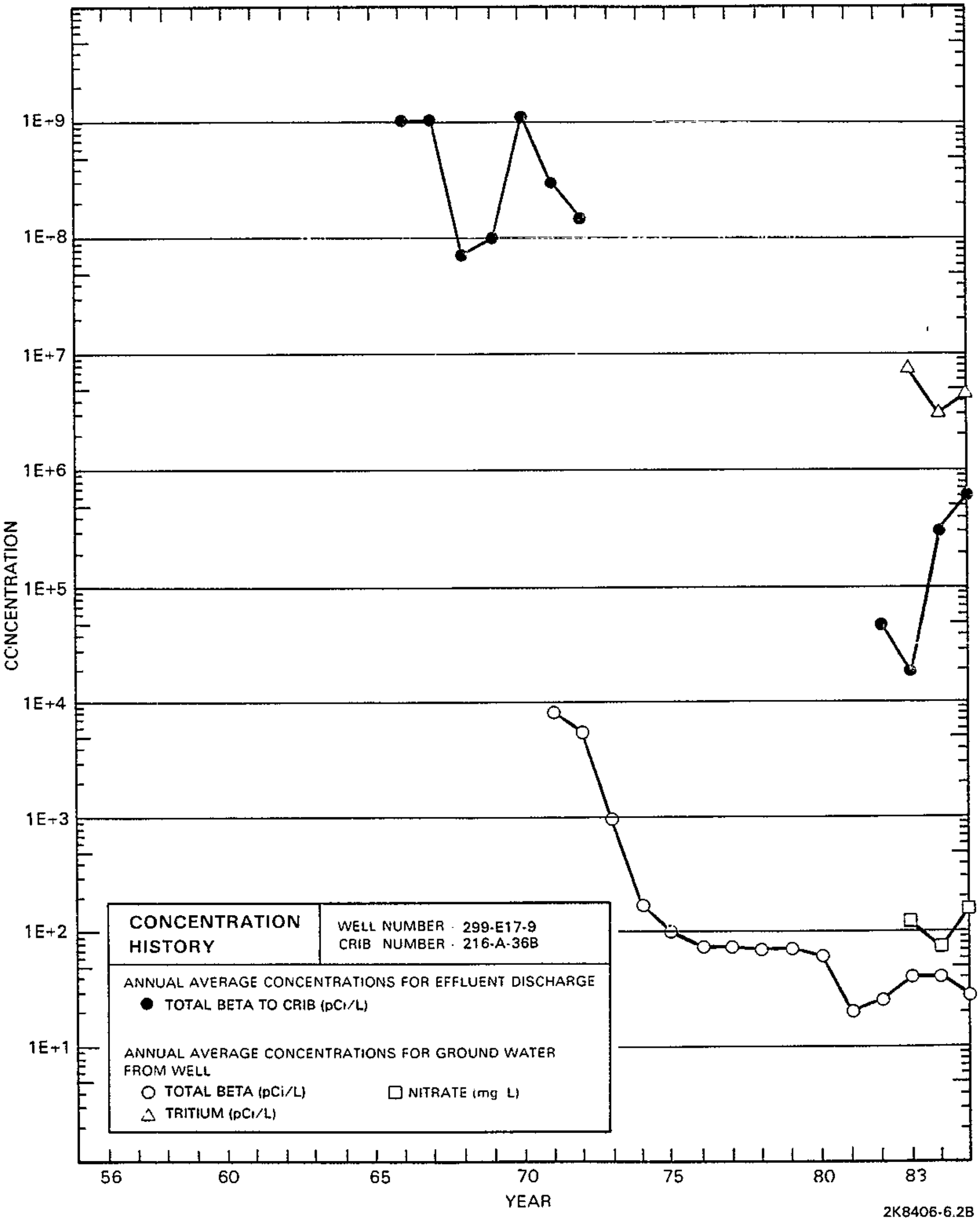

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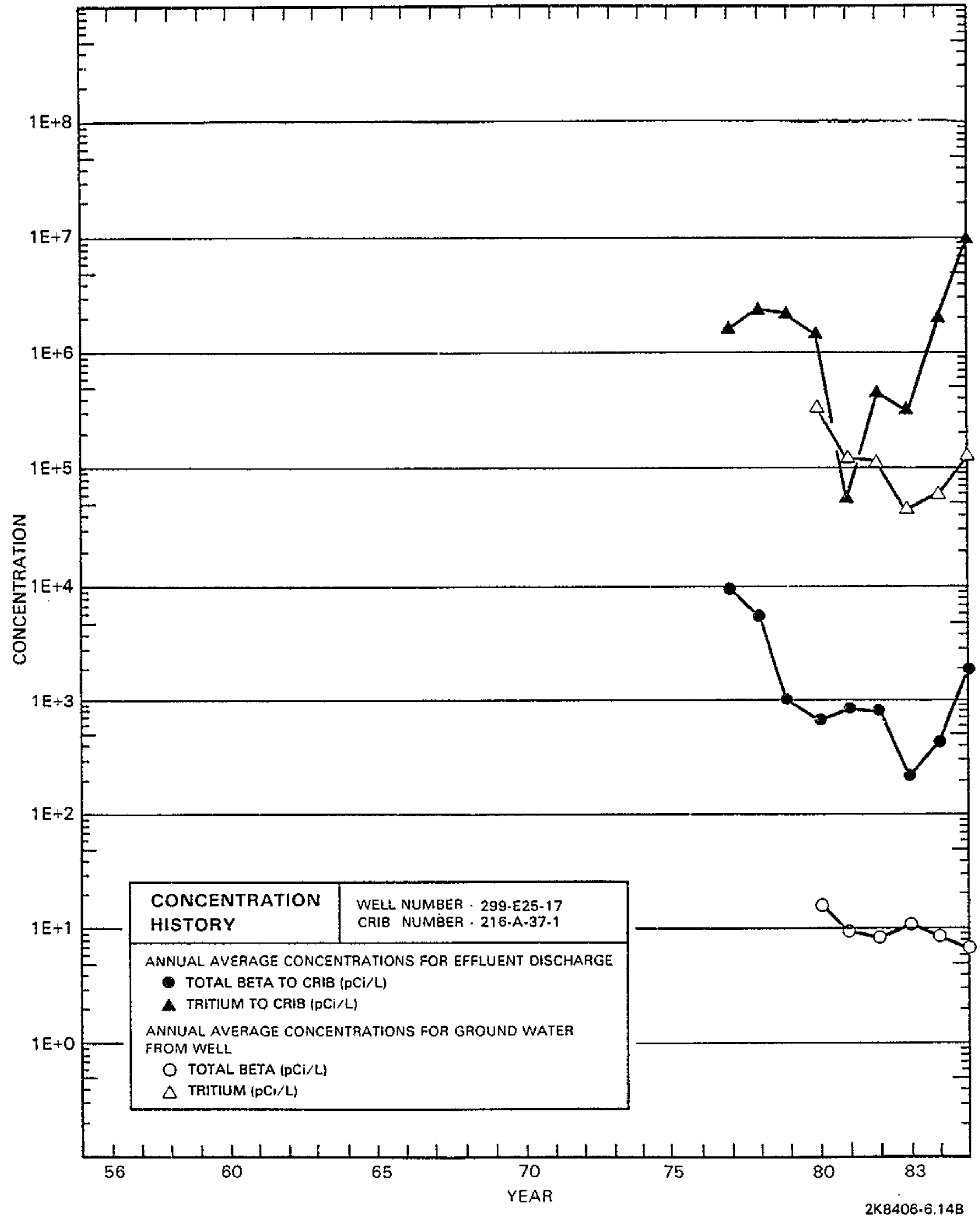
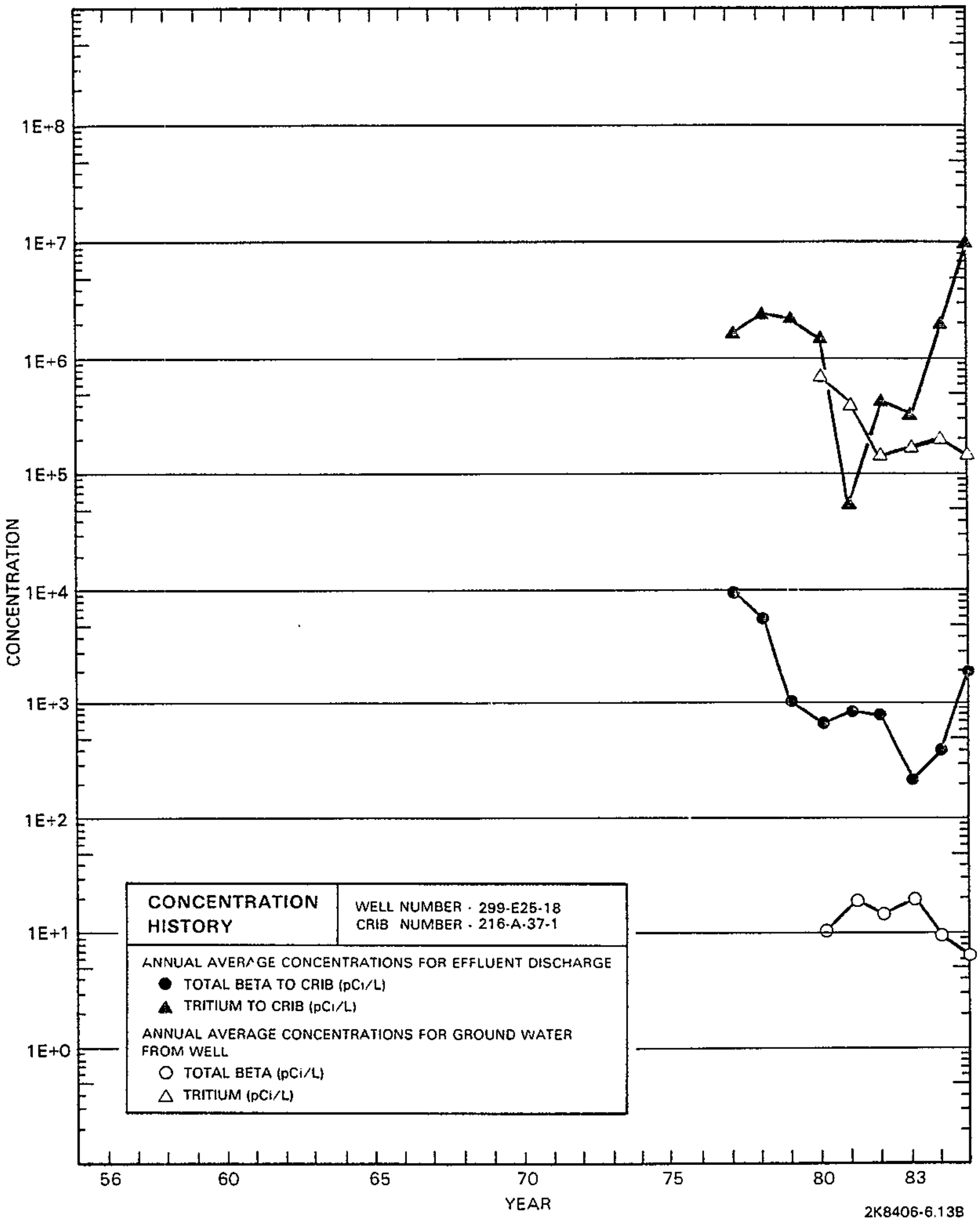


Well 299-E25-17, Crib 216-A-37-1.



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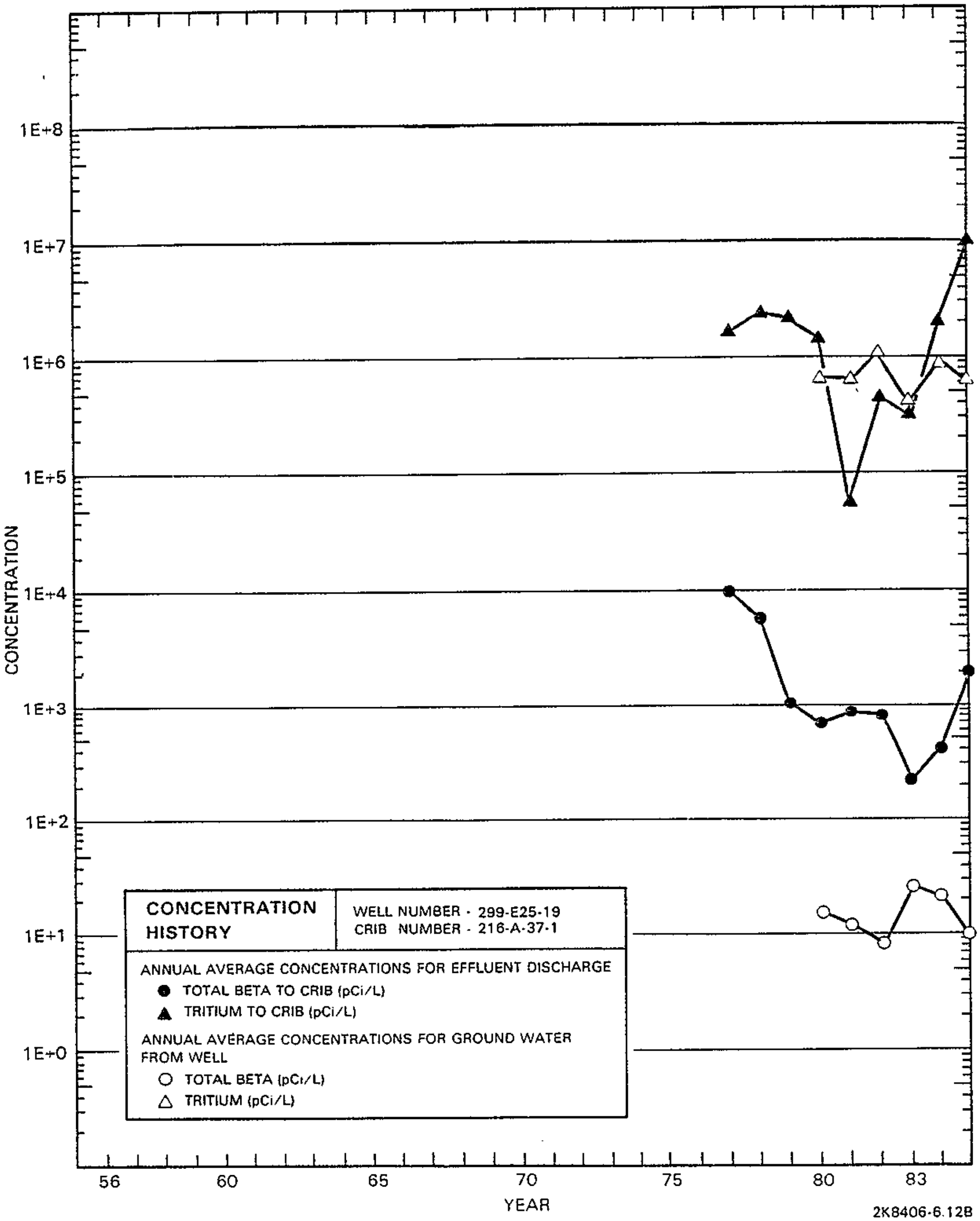

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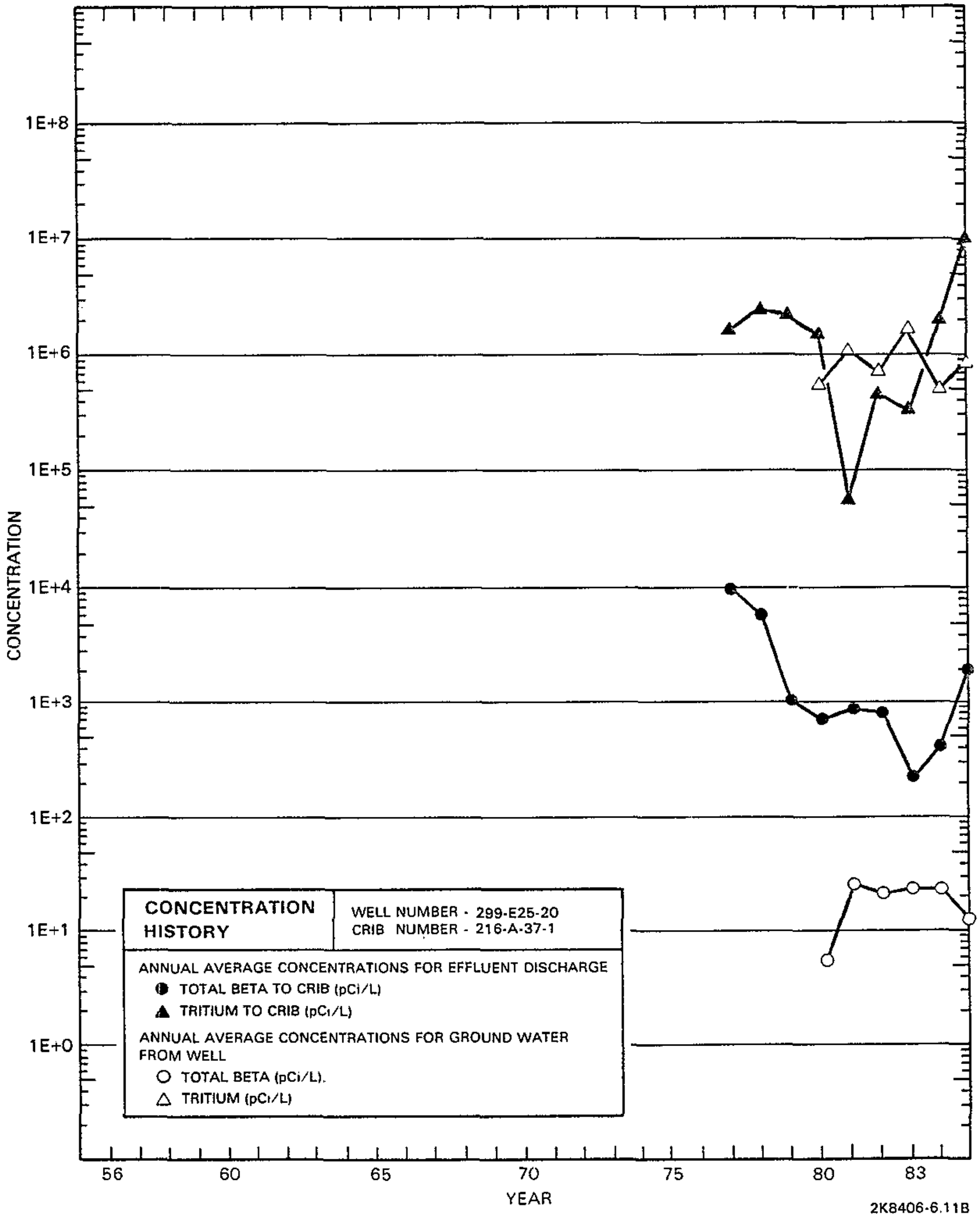

Well 299-E25-20, Crib 216-A-37-1.

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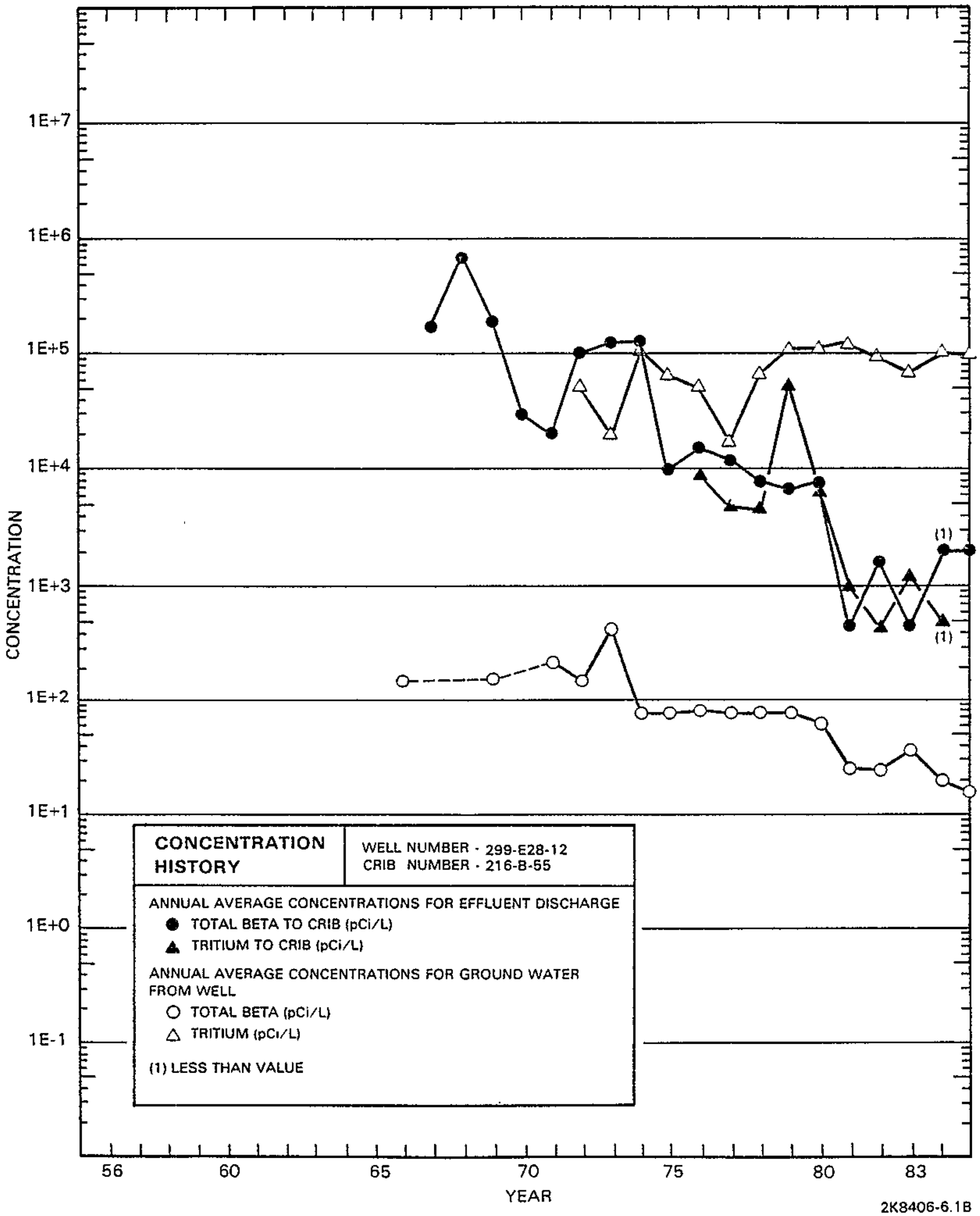

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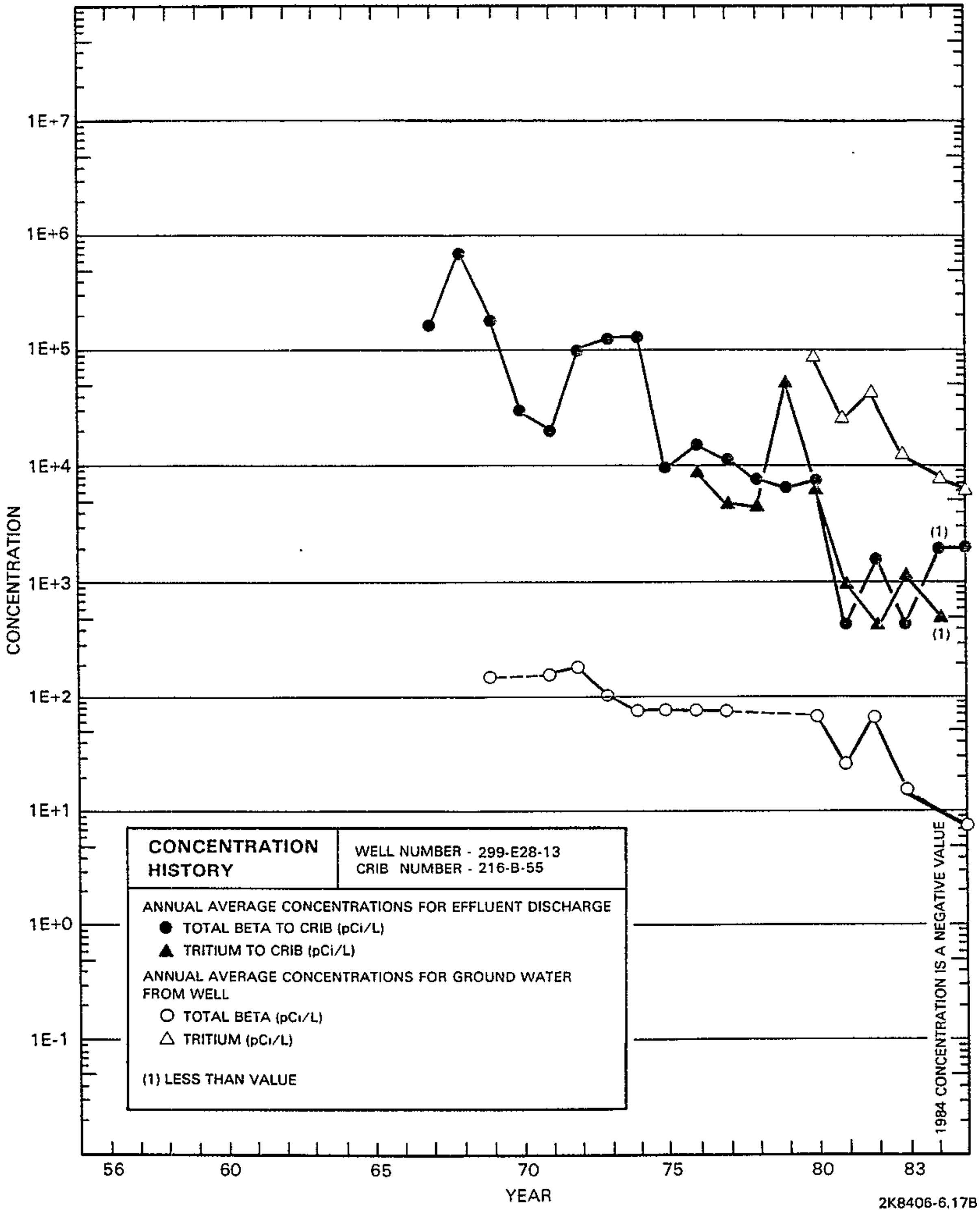

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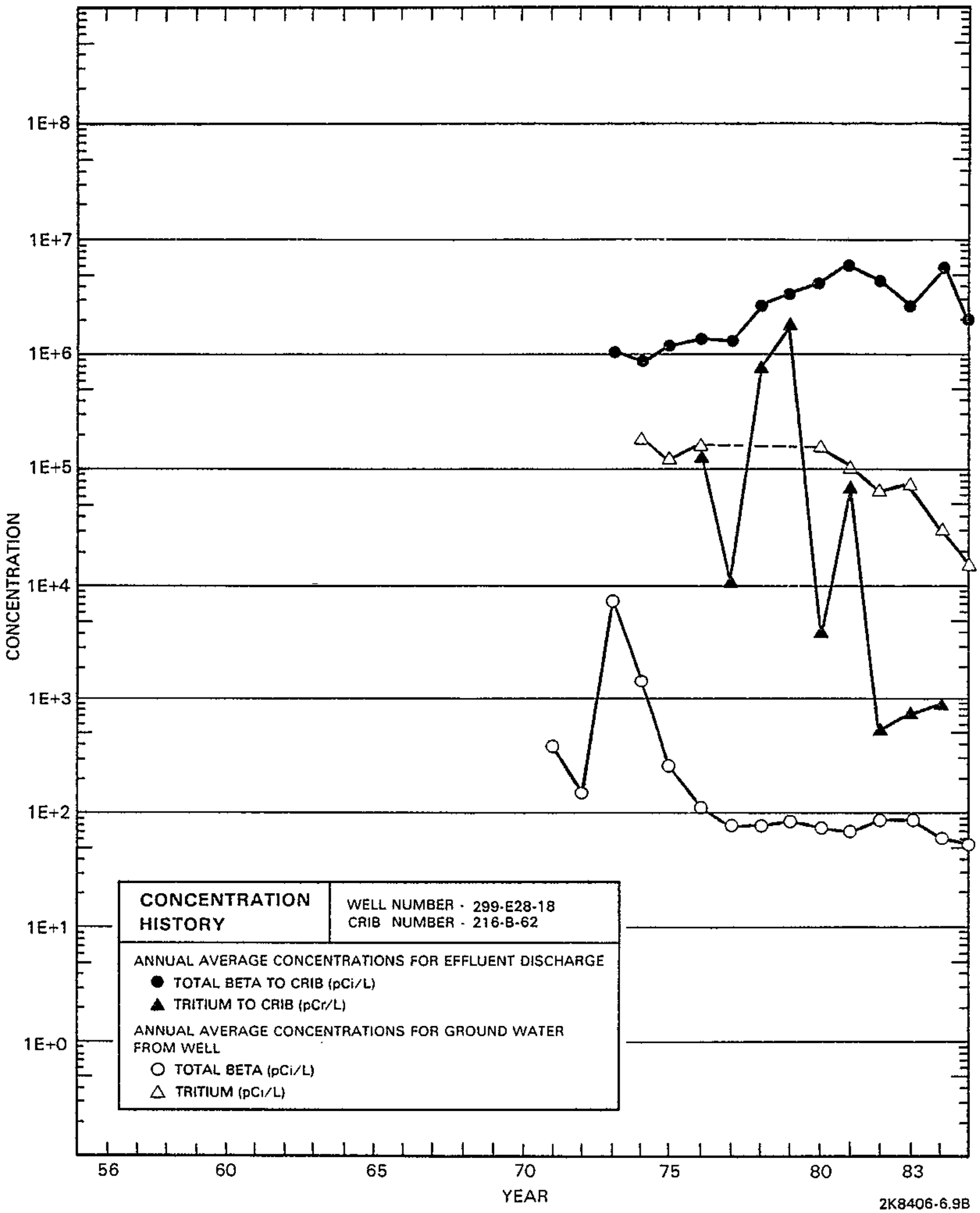

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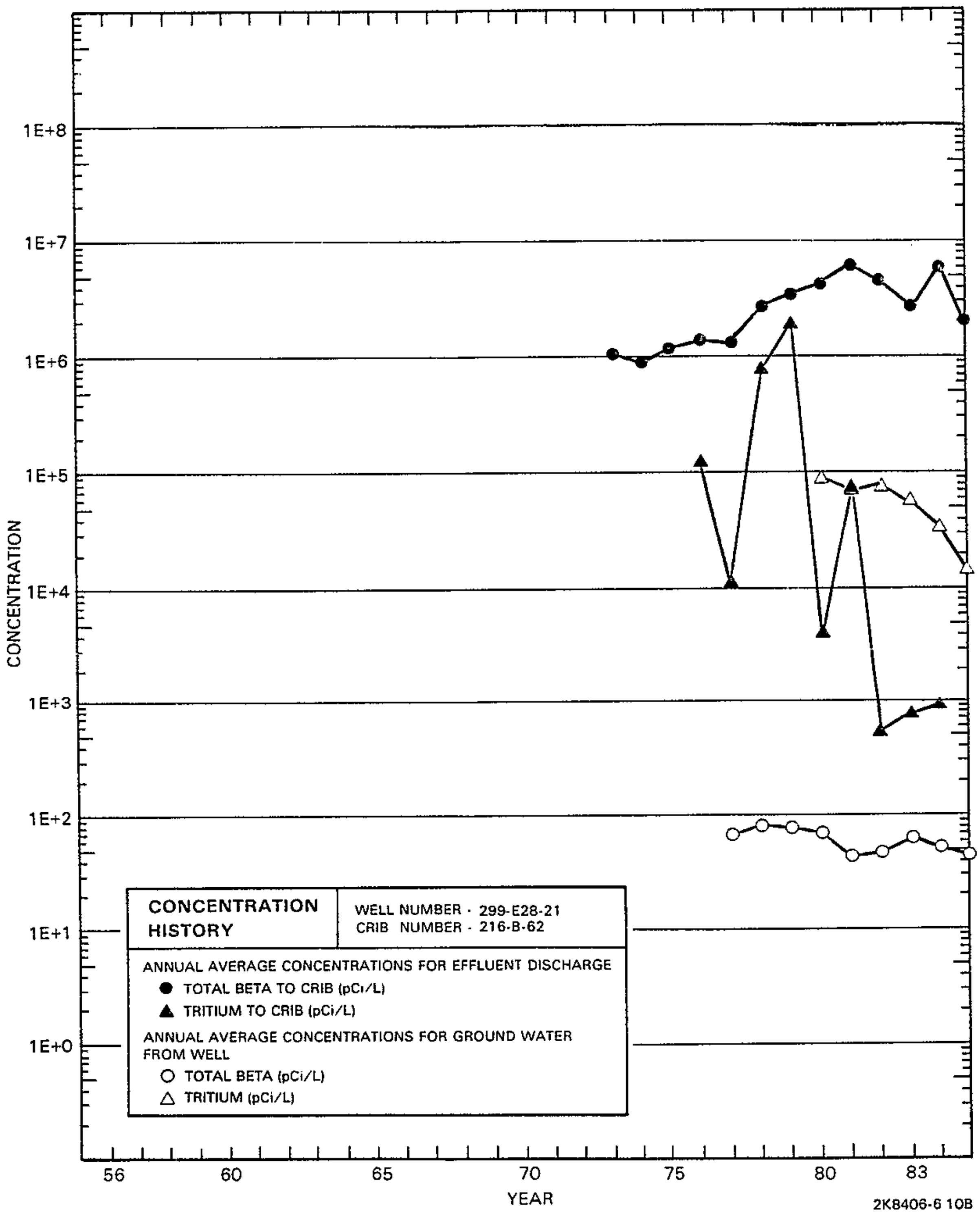

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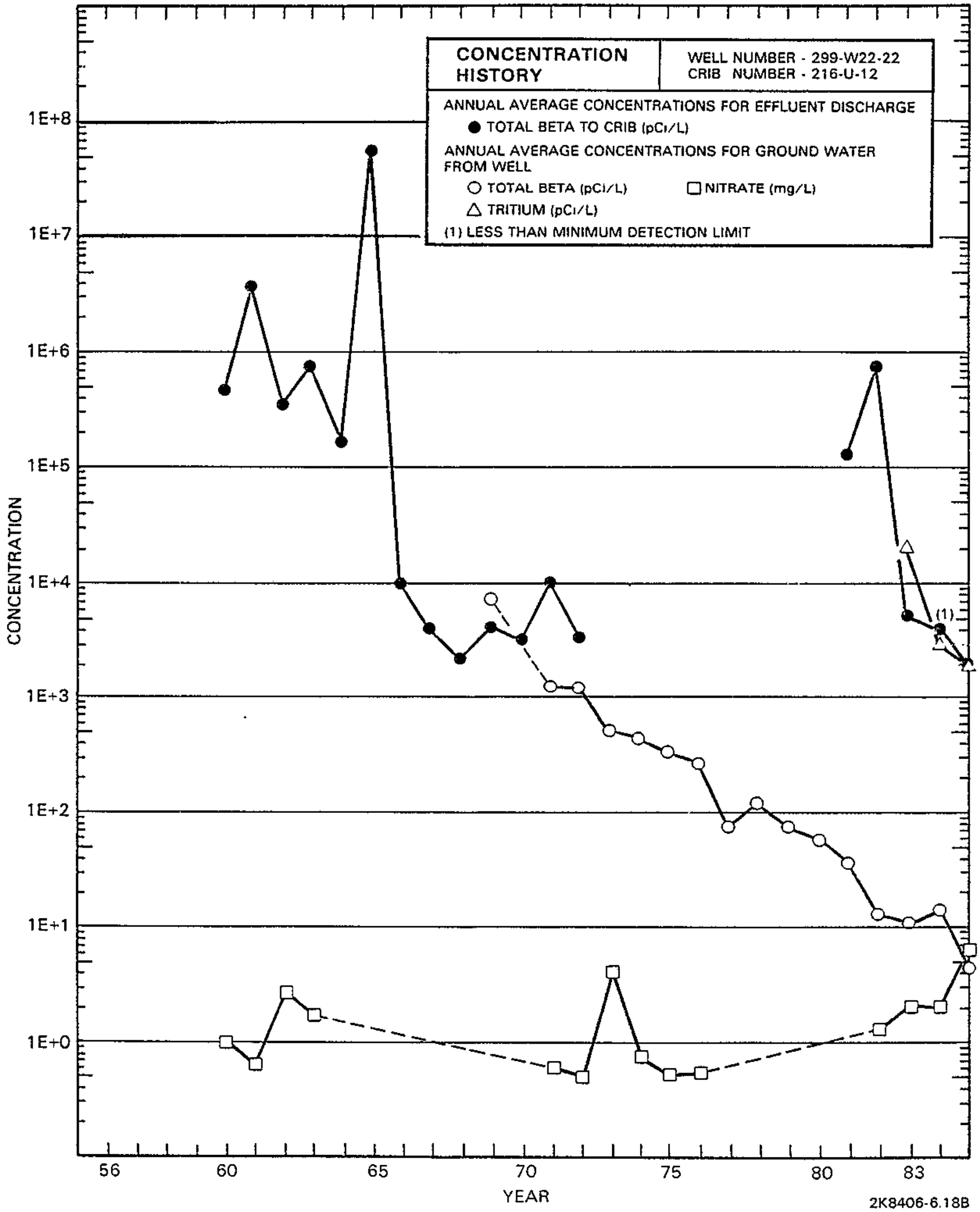

Well 299-W22-22, Crib 216-U-12.

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APPENDIX E

CONCENTRATIONS OF URANIUM AND NITRATE FROM WELLS AT THE 216-U-1/2 CRIBS AND 216-S-25 CRIB

Tables:

9 9 0 3 5 5 3 2 1 2 9

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Table E-1. Concentration of Uranium and Nitrate from Well 299-W19-3 at the 216-U-1/2 Cribs.

Sample Date	Uranium (pCi/L)	Nitrate (mg/L)
01/30/85	9.74E+03	1.55E+03
02/25/85	8.05E+03	NA[a]
03/07/85	4.92E+03	NA
03/07/85	9.91E+03	NA
03/08/85	8.26E+03	NA
03/08/85	1.16E+04	NA
03/09/85	9.06E+03	NA
03/09/85	1.02E+04	NA
05/14/85	1.13E+04	NA
05/29/85	9.83E+03	5.13E+02
06/13/85	1.29E+04	3.94E+02
06/21/85	1.20E+04	3.55E+02
06/26/85	1.29E+04	3.39E+02
07/09/85	8.54E+03	2.17E+02
07/15/85	9.90E+03	2.07E+02
08/01/85	7.87E+03	1.42E+02
08/05/85	6.99E+03	3.00E+01
08/13/85	7.06E+03	1.66E+02
08/20/85	6.85E+03	1.66E+02
08/26/85	7.33E+03	8.19E+01
08/27/85	7.26E+03	1.40E+02
09/04/85	7.33E+03	1.26E+02
09/11/85	7.33E+03	1.06E+02
09/17/85	6.85E+03	9.78E+01
09/24/85	5.25E+03	8.37E+01
10/04/85	5.82E+03	8.14E+01
10/10/85	6.04E+03	6.77E+01
10/15/85	7.06E+03	8.06E+01
10/24/85	5.69E+03	7.39E+01
11/01/85	4.37E+03	5.58E+01
11/08/85	5.25E+03	6.60E+01
11/14/85	6.18E+03	7.04E+01
12/06/85	4.42E+03	5.75E+01
12/31/85	4.80E+03	6.64E+01

[a]No analysis requested.

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Table E-2. Concentration of Uranium and Nitrate from Well 299-W19-9 at the 216-U-1/2 Cribs. (sheet 1 of 3)

Sample Date	Uranium (pCi/L)	Nitrate (mg/L)
06/07/85	2.98E+04	1.48E+03
06/13/85	3.91E+04	1.22E+03
06/14/85	2.61E+04	1.20E+03
06/15/85	2.61E+04	1.42E+03
06/16/85	3.13E+04	1.47E+03
06/20/85	3.38E+04	1.38E+03
06/21/85	3.73E+04	9.78E+02
06/24/85	2.33E+04	1.59E+03
06/25/85	2.58E+04	1.43E+03
06/26/85	2.82E+04	1.46E+03
06/28/85	2.11E+04	1.51E+03
07/01/85	2.38E+04	1.16E+03
07/02/85	2.39E+04	1.16E+03
07/03/85	2.44E+04	1.14E+03
07/06/85	2.03E+04	1.07E+03
07/08/85	2.17E+04	8.81E+02
07/09/85	2.06E+04	7.66E+02
07/10/85	2.66E+04	8.41E+02
07/11/85	2.32E+04	1.05E+03
07/12/85	1.81E+04	7.88E+02
07/13/85	2.29E+04	8.06E+02
07/15/85	2.44E+04	7.75E+02
07/16/85	2.12E+04	6.98E+02
07/17/85	1.83E+04	7.84E+02
07/18/85	2.01E+04	7.75E+02
07/19/85	2.23E+04	7.75E+02
07/22/85	1.77E+04	3.32E+02
07/23/85	1.93E+04	6.64E+02
07/24/85	1.62E+04	5.98E+02
07/25/85	1.99E+04	6.68E+02
07/26/85	1.91E+04	6.50E+02
07/29/85	1.83E+04	6.24E+02
07/30/85	1.90E+04	5.27E+02
08/01/85	1.88E+04	6.63E+02

Table E-2. Concentration of Uranium and Nitrate from Well 299-W19-9 at the 216-U-1/2 Cribs. (sheet 2 of 3)

Sample Date	Uranium (pCi/L)	Nitrate (mg/L)
08/02/85	1.82E+04	5.84E+02
08/05/85	1.73E+04	5.11E+02
08/06/85	1.85E+04	5.26E+02
08/07/85	1.40E+04	5.55E+02
08/08/85	1.59E+04	5.27E+02
08/09/85	1.31E+04	5.22E+02
08/10/85	1.46E+04	5.11E+02
08/12/85	1.90E+04	5.53E+02
08/13/85	1.89E+04	4.65E+02
08/14/85	1.62E+04	5.44E+02
08/15/85	1.59E+04	5.31E+02
08/16/85	1.35E+04	5.22E+02
08/20/85	1.68E+04	4.96E+02
08/21/85	1.49E+04	5.31E+02
08/22/85	1.53E+04	4.96E+02
08/23/85	1.73E+04	4.38E+02
08/26/85	1.59E+04	5.13E+02
08/27/85	1.52E+04	4.65E+02
08/28/85	1.84E+04	4.69E+02
08/29/85	1.31E+04	4.65E+02
08/30/85	1.59E+04	4.82E+02
09/03/85	1.59E+04	4.31E+02
09/04/85	1.52E+04	4.38E+02
09/09/85	1.54E+04	4.09E+02
09/10/85	1.52E+04	4.28E+02
09/11/85	1.39E+04	4.28E+02
09/12/85	1.56E+04	4.32E+02
09/13/85	1.24E+04	4.10E+02
09/17/85	1.21E+04	3.62E+02
09/18/85	1.35E+04	3.52E+02
09/19/85	1.33E+04	3.78E+02
09/20/85	1.32E+04	3.67E+02
09/23/85	1.41E+04	3.32E+02
09/24/85	1.29E+04	3.37E+02

Table E-2. Concentration of Uranium and Nitrate from Well 299-W19-9 at the 216-U-1/2 Cribs. (sheet 3 of 3)

Sample Date	Uranium (pCi/L)	Nitrate (mg/L)
09/25/85	1.39E+04	3.32E+02
09/26/85	1.35E+04	4.02E+02
09/27/85	1.42E+04	3.22E+02
09/30/85	1.41E+04	2.62E+02
10/01/85	1.46E+04	3.33E+02
10/02/85	1.46E+04	3.16E+02
10/03/85	1.34E+04	3.16E+02
10/04/85	1.35E+04	3.44E+02
10/07/85	1.21E+04	2.92E+02
10/08/85	1.48E+04	3.08E+02
10/09/85	1.39E+04	2.92E+02
10/10/85	1.25E+04	2.56E+02
10/11/85	1.28E+04	2.77E+02
10/14/85	1.13E+04	3.62E+02
10/15/85	1.40E+04	2.73E+02
10/18/85	1.24E+04	2.70E+02
10/21/85	1.35E+04	2.50E+02
10/22/85	1.34E+04	2.53E+02
10/24/85	1.46E+04	2.53E+02
10/28/85	1.24E+04	2.57E+02
10/29/85	1.12E+04	2.57E+02
10/30/85	1.08E+04	2.32E+02
10/31/85	1.24E+04	2.44E+02
11/01/85	1.42E+04	2.42E+02
11/04/85	1.12E+04	2.35E+02
11/05/85	1.05E+04	2.21E+02
11/06/85	1.22E+04	2.38E+02
11/07/85	1.19E+04	2.21E+02
11/08/85	1.07E+04	2.29E+02
11/11/85	1.31E+04	2.12E+02
11/12/85	1.28E+04	2.20E+02
11/14/85	1.28E+04	2.20E+02
11/21/85	1.39E+04	1.85E+02
11/26/85	1.30E+04	1.51E+02
12/31/85	1.28E+04	2.31E+02

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Table E-3. Concentration of Uranium and Nitrate from Well 299-W19-11 at the 216-U-1/2 Cribs.

Sample Date	Uranium (pCi/L)	Nitrate (mg/L)
01/23/85	5.18E+04	1.51E+03
02/25/85	6.71E+04	NA[a]
03/05/85	1.04E+05	NA
03/05/85	1.08E+05	NA
03/06/85	4.92E+04	NA
03/06/85	1.02E+05	NA
03/07/85	4.92E+04	NA
03/07/85	6.95E+04	NA
03/08/85	5.00E+04	NA
03/08/85	5.29E+04	NA
03/09/85	5.74E+04	NA
03/21/85	6.90E+04	9.52E+02
05/14/85	4.55E+04	5.05E+02
05/23/85	NR[b]	3.98E+02
06/13/85	4.86E+04	NR
06/14/85	4.97E+04	3.56E+02
06/21/85	6.89E+04	1.62E+02
06/26/85	5.33E+04	1.54E+02
07/09/85	4.25E+04	1.14E+02
07/15/85	5.30E+04	1.21E+02
08/01/85	3.76E+04	8.85E+01
08/05/85	3.43E+04	8.30E+01
08/13/85	2.72E+04	7.17E+01
08/20/85	3.21E+04	7.84E+01
08/26/85	NR	7.13E+01
08/27/85	2.56E+04	1.05E+02
09/04/85	2.52E+04	6.86E+01
09/11/85	2.68E+04	8.19E+01
09/17/85	2.48E+04	7.79E+01
09/24/85	1.88E+04	8.99E+01
10/04/85	2.40E+04	9.30E+02
10/10/85	2.20E+04	8.50E+01
10/15/85	3.13E+04	1.14E+02
10/24/85	2.39E+04	8.94E+01
11/01/85	1.12E+04	1.08E+02
11/08/85	2.14E+04	8.06E+01
11/14/85	1.77E+04	8.50E+01
12/06/85	1.60E+04	2.12E+01
12/31/85	2.39E+04	6.99E+01

[a]No analysis requested.

[b]No results available.

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Table E-4. Concentration of Uranium and Nitrate from Well 299-W19-15 at the 216-U-1/2 Cribs.

Sample Date	Uranium (pCi/L)	Nitrate (mg/L)
06/21/85	7.84E+03	5.22E+01
06/26/85	5.80E+03	7.92E+01
07/09/85	3.76E+03	9.07E+01
07/15/85	3.93E+03	1.05E+02
07/22/85	3.32E+03	9.60E+01
07/29/85	3.12E+03	9.52E+01
08/05/85	4.70E+03	7.85E+01
08/12/85	3.21E+03	9.45E+01
08/20/85	2.68E+03	9.03E+01
08/27/85	3.78E+03	1.03E+02
09/04/85	2.65E+03	9.92E+01
09/11/85	2.86E+03	1.03E+02
09/17/85	2.41E+03	9.69E+01
09/24/85	2.81E+03	8.28E+01
10/04/85	2.86E+03	7.04E+01
10/10/85	3.17E+03	6.77E+01
10/15/85	3.86E+03	6.46E+01
10/24/85	3.53E+03	5.67E+01
11/01/85	2.67E+03	5.58E+01
11/08/85	2.58E+03	6.60E+01
11/14/85	2.09E+03	5.27E+01
11/19/85	2.01E+03	4.69E+01
12/06/85	4.83E+03	3.87E+01
12/19/85	3.50E+03	1.00E+02

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Table E-5. Concentration of Uranium and Nitrate from Well 299-W19-16 at the 216-U-1/2 Cribs.

Sample Date	Uranium (pCi/L)	Nitrate (mg/L)
06/13/85	2.28E+04	3.81E+02
06/21/85	2.15E+04	4.69E+02
06/26/85	1.84E+04	5.67E+02
07/09/85	1.69E+04	3.42E+02
07/15/85	1.20E+04	3.63E+02
07/22/85	9.48E+03	3.08E+02
07/29/85	8.97E+03	2.88E+02
08/16/85	5.29E+03	2.43E+02
08/20/85	7.06E+03	3.16E+02
08/27/85	7.60E+03	1.26E+02
09/04/85	6.27E+03	2.22E+02
09/11/85	6.07E+03	1.78E+02
09/17/85	5.01E+03	1.66E+02
09/24/85	4.93E+03	1.46E+02
10/02/85	5.15E+03	1.33E+02
10/10/85	4.42E+03	1.01E+02
10/15/85	4.98E+03	1.15E+02
10/24/85	4.08E+03	1.17E+02
11/01/85	3.44E+03	1.24E+02
11/08/85	3.07E+03	1.03E+02
11/14/85	3.64E+03	8.59E+01
11/19/85	3.05E+03	8.72E+01
12/06/85	5.79E+03	3.18E+02
12/19/85	5.13E+03	1.88E+02

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Table E-6. Concentration of Uranium and Nitrate from Well 299-W23-9 at the 216-S-25 Crib.

Sample Date	Uranium (pCi/L)	Nitrate (mg/L)
06/26/85	8.62E-01	1.01E+00
07/09/85	1.29E+00	2.47E+00
07/15/85	5.51E+00	6.00E-01
07/22/85	7.47E+00	1.80E+00
07/29/85	1.69E+00	1.24E+00
08/05/85	7.54E+00	1.93E+00
08/15/85	4.92E+00	7.70E-01
08/22/85	3.47E+00	5.10E-01
08/27/85	4.04E+00	5.10E-01
09/05/85	3.25E+00	2.50E-01
09/11/85	3.01E+00	3.70E-01
09/17/85	1.82E+00	4.00E-01
09/24/85	2.82E+00	7.80E-01
10/10/85	1.87E+00	2.84E+00
10/15/85	2.59E+00	5.00E-01
10/24/85	2.25E+00	2.80E-01
11/01/85	3.20E+00	4.50E-01
12/06/85	2.55E+00	1.74E+00
12/19/85	6.31E+00	1.17E+00

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Table E-7. Concentration of Uranium and Nitrate from Well 299-W23-10 at the 216-S-25 Crib.

Sample Date	Uranium (pCi/L)	Nitrate (mg/L)
06/26/85	1.39E+01	6.64E-01
07/09/85	2.49E+01	1.84E+00
07/15/85	1.95E+01	4.80E-01
07/25/85	2.10E+01	7.00E-01
07/29/85	1.64E+01	6.20E-01
08/05/85	1.68E+01	4.40E-01
08/12/85	1.83E+01	7.70E-01
08/20/85	1.70E+01	1.29E+00
08/27/85	1.81E+01	1.29E+00
09/04/85	1.65E+01	3.80E+00
09/11/85	1.44E+01	1.12E+01
09/17/85	1.48E+01	1.04E+01
09/24/85	1.74E+01	8.45E+00
10/02/85	1.63E+01	9.43E+00
10/10/85	1.89E+01	1.56E+01
10/15/85	1.81E+01	2.24E+01
10/24/85	1.87E+01	2.28E+01
11/01/85	1.33E+01	3.05E+00
11/08/85	1.33E+01	7.22E+00
11/14/85	1.22E+01	3.49E+00
12/06/85	1.68E+01	6.86E+00
12/19/85	1.35E+01	1.02E+00

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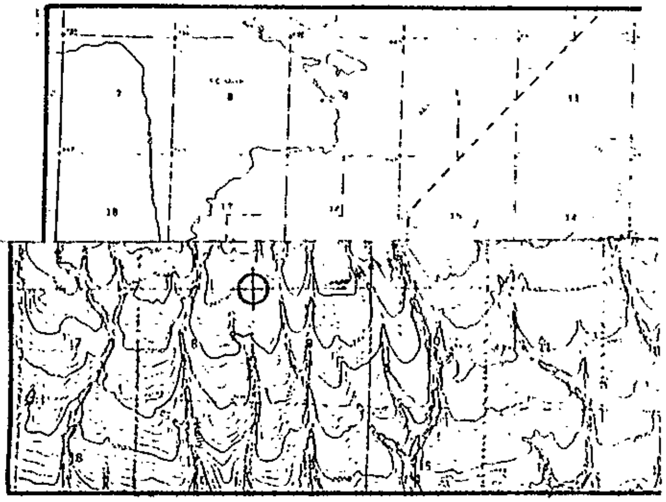

SCALE

0 1 2 3 MILES

0 1 2 3 KILOMETERS

GN MIN

1° 43' / 31 MILS

21° / 373 MILS

UTM GRID AND 1951 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

● WELLS USED IN PREPARATION OF MAP

PONDS, WATER SURFACE ELEVATION (ft-MSL)

BASALT OUTCROPS ABOVE WATER TABLE, AS INFERRED

—10— WATER TABLE CONTOURS IN FEET ABOVE MEAN SEA LEVEL (ft-MSL) (10 FOOT CONTOUR INTERVAL)

*FORMER LOCATION OF U POND
DEACTIVATED IN 1984

BASE MAPS ARE PORTIONS OF HANFORD, COYOTE RAPIDS, RICHLAND AND CORRAL 15' QUADRANGLES
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